carolina planning

vol. 5 no. 2, fall 1979

Introduction

With the expansion of the planning profession in the last decade, it has become increasingly difficult to adequately summarize the range of issues with which planners must be concerned. As the profession has expanded, in both numbers and scope, there has been a trend toward greater specialization on the part of individual planners. By now, the list of distinct disciplines in which planners work has become quite long: energy planning, service provision, resource utilization, growth management, to name but a few. One of the dangers of specialization is that we, as individuals, will focus our efforts along ever more narrow pathways, without addressing the complex relationships between the problems which confront our society.

The theme of this issue of *carolina planning* might well be characterized as a call for more dialogue among planners in all fields. We have not presented a concentration of articles on a single issue of current concern, as have several of our past issues. Instead, we have chosen articles to reflect the diversity of issues with which planners are concerned.

As we complete our fifth year of publication, the staff of *carolina planning* wishes to acknowledge the receptivity with which the North Carolina planning community has greeted our efforts. The North Carolina Chapter of the American Planning Association now provides a subscription to *cp* as a special service to each of its members. We feel much closer to our goal of providing a popular forum for planning issues in the Southeast. The change in format which was introduced in the Spring, 1979 issue has been well recieved by our readers, and has enabled us to hold printing cost increases to a minimum during this time of high inflation.

As always, we welcome any comments by our readers on the design and content of *carolina planning*, and we encourage you to send us manuscripts which would be of interest to other planners for publication in future editions. The Spring, 1980 edition will focus on local planning problems and issues, while we are planning an energy focus for the Fall, 1980 edition. If our readers have articles which they wish to submit for publication in either of these issues, please contact us immediately. We appreciate your continued support for *carolina planning*.

John R. Marling

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Cover photo by Dick Pebody, U. S. Department of Energy. The world's largest wind turbine generator, located in Boone, North Carolina.

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carolina planning is published semi-annually by the students in the Department of City and Regional Planning, University of North Carolina at Chapel Hill, with the assistance of funds from the University and the John A. Parker Trust Fund, Department of City and Regional Planning.

carolina planning welcomes submissions from our readers. Article-length manuscripts should be typed with a maximum of twenty double-spaced pages. *carolina forum* pieces report on interesting activities or present opinions on planning issues, and should be typed with a maximum of seven double-spaced pages.

Subscriptions to *carolina planning* are available at an annual rate of $7.00 ($8.50 outside North America), or $13.00 for two years ($14.50 outside North America). Address all manuscripts to the Editor, and all subscription and back issue requests to the Circulation Manager, *carolina planning*, New East 033A, University of North Carolina, Chapel Hill, North Carolina 27514.

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carolina forum

New Towns in Limbo: An Interview With Soul City Developer, Floyd B. McKissick, Sr.

The 1968 Urban Growth and New Communities Act (Title IV) and, subsequently, the 1970 Act (Title VII) brought a new development movement into focus. In the five years following the first piece of legislation, the U.S. Department of Housing and Urban Development (HUD) approved thirteen new communities for financing under the Title IV and Title VII programs. Title VII was, in effect, a continuance of Title IV's basic provisions with an added emphasis on federal commitments. Briefly, the goals of Congress for Title VII were 1) to encourage well planned, large-scale developments which related to the planning and growth objectives of the area; 2) to encourage the development of relatively self-sufficient communities that would provide job opportunities to their residents, as well as modern educational and health care delivery systems and cultural opportunities; 3) to provide jobs and housing facilities open to all regardless of race, creed, or color, and for all income groups; 4) to encourage innovation and improve efficiency; 5) to help revitalize older urban centers through "town-in-town" development; and 6) to encourage growth in areas losing population, and to help discourage emigration from predominantly rural areas to already over-burdened central cities, by encouraging growth in selected small communities in such areas.

Title VII was intended to encourage a maximum of private involvement in the development of new communities. As such, it was designed to be broad and flexible enough to make almost any kind of institutional arrangement eligible for assistance provided that it was satisfactory to the Secretary of HUD. Congress recognized that some developments would require a private-public partnership; a public agency would provide necessary social services and a private concern would handle necessary housing construction, shopping, and industrial development. Since new town development demands a large investment in land and infrastructure, in addition to the cost of holding land throughout the ten to thirty year construction period, the private developer must have the backing of a financier and patient money to sustain the project until positive cash flow is produced. More often than not, the federal government, specifically the New Community Development Corporation of HUD, is the financier who can make that long-term money available. Title VII recognized the financial demand in the early years of development and provided for loans to developers to assist them in meeting interest payments of their indebtedness, repayment of which can be deferred for fifteen years. There were loan guarantees, interest differential grants, public service grants, supplementary grants, and special planning assistance which could be made available to help achieve a viable, stable existence for the new communities. Title VII was a major commitment by the federal government to an effort that was given only encouragement under previous legislation (Title IV and Title X).

Of the thirteen new communities financed by HUD, seven have defaulted on their guaranteed loans and expectations. Park Forest South (Illinois), Cedar-Reverside and Jonathan (Minnesota), Ganada and Reverton (New York), Newfields (Ohio), and Flower Mound (Texas) were not given continued aid through HUD's framework. Continuing with future housing grants by HUD, as announced in September, 1978, were Maumelle (Arkansas), Shenandoah (Georgia), St. Charles (Maryland), Harbison (South Carolina), The Woodlands (Texas), and Soul City (North Carolina). The most money backing given to a town by HUD was for The Woodlands, in Texas ($50 million); the least amount was for Harbison, South Carolina ($13 million that was made fully available). Soul City received the next least amount in guaranteed loans, $14 million, of which it has drawn only $10 million. The majority of the new towns are satellite communities around major growth centers, or new "towns-in-town"; Soul City, located in a rural, economically depressed area, is the only free-

standing new town project and the only minority-headed development. As such, Soul City, more than any other of the HUD financed new towns, fulfills the goals set forth by Congress in the enactment of Title VII. The social objectives are as important as financial viability in judging the worth of experimental models, and they are of primary importance in the early years.

Even though plans for the freestanding new community of Soul City were announced in January, 1969 and application was submitted to HUD in 1970, it was not until June, 1972 that HUD made the commitment to guarantee $14 million worth of bonds for the development. It was March, 1974 when the bonds were made available and $5 million were actually sold at that time. In December, 1976 a second $5 million was borrowed for a variety of projects in a three-county area, including a regional water system servicing over 50,000 users and a HealthCo clinic currently treating 60 outpatients per day in a two-county area. Soul City still lacks sewer capacity but this will be remedied by a new sewage treatment plant planned for Warren County which will benefit all the county's residents. Until adequate facilities are completed, further development of Soul City will be difficult. Good recreational facilities are available at Soul City, the only ones of public access in the county, and a fire station is nearly complete, both of which serve basic needs in any community.

Soul City developer Floyd B. McKissick, Sr. Photo by Siddell.

In March, 1975 Senator Helms of North Carolina accused the Soul City Company of misappropriation of funds and lagging behind in development. A General Accounting Office audit was requested; after spending $500,000 and stopping further development at Soul City until December 1975, Soul City was given a clean bill of accountability. Much unfavorable and hostile publicity was generated and a general lack of information was found outside the area. Further pressures and proposals to bar more loans to Soul City came this year with a HUD decision to foreclose on Soul City and Newfields, Ohio. Soul City was judged not financially feasible, with inadequate security for the $10 million it held in bonds. In September, the foreclosure notice was released, with somewhat more warning than was received for the first announcement. Floyd McKissick decided to fight the issue in court, and, after a preliminary hearing, the two parties were given until 26 November to come to a settlement. A discovery motion was granted the Soul City developer to find out what correspondence HUD had received that might have influenced its decision to act toward foreclosure.

carolina planning: Are Soul City's problems comparable to other new towns'?

McKissick: Yes and no. Many of the other towns have defaulted on their loans from the federal government and have been foreclosed, which is comparable to what HUD wants to do with us, but we haven't defaulted yet. They can use their power to make us default so they can create an opportunity to foreclose.

c p: How can they make you default?

McKissick: The whole process under the law is making us a viable and an acceptable risk under the government's terms. Once we develop the financing mechanism plan where the government puts in so much money per contract, we are dependent on them and if they withdraw the money, of course we are in financial distress and can't pay the bills. And too, we have no right to go anywhere else to draw that money or to create any other liens on the property because the government has the first one. We're at their mercy.

c p: So they withdraw the funds?

McKissick: They can disapprove a budget that we submit for approval, then we'll have no operating capital.

c p: This discovery motion that you were granted will enable you to find out what had bearing on HUD's actions and announcements in June?

McKissick: On 28 June, when they made the announcement, we were of the assumption we would get monies for speculative buildings so we could continue the development of the projects. We all knew we had a product to market but it couldn't be done without the sewer, utilities, railroad spur, and other things necessary for industrial development. The real lack of utilities is what has made these counties backward over a period of years. They have been following patterns and practices begun in the late 1700s. Looking on the map you'll see hundreds of towns living in this 19th century syndrome; they really don't exist except in name because agri-businesses have just about absorbed them. So we must develop excellent farm practices with the right equipment and use the labor here to change things.

c p: That generally requires capital up front.

McKissick: When I came to this economically depressed area, people thought of me as a total fool for bringing the new town concept down here. I was associated with James Rouse in Maryland and my whole staff went there for training in spite of of common thinking that it was a foolish thing and that this place was useless, desolate, and would never be developed. But with basic initial funding for the necessities, it will develop almost by itself.

Social objectives are of critical importance when working with experimental models.
Photo by Charles Weiss.

c p: What kind of training did you undergo there?

McKissick: General new town development. He is a developer of many shopping centers, new towns, and new communities. He may probably be considered the father of American new towns.

c p: Columbia, Maryland, the new town under his management, is one of the few successful new towns. Isn't it wholly privately developed?

McKissick: Yes, it is a successful new town without using federal money and it's a matter of accounting processes as to how one does it. That's one reason Soul City can't be judged a failure because it is planned over a period of thirty years. How can they abort it after only ten years from its conception? We couldn't actually get anything started until 1974; then we didn't have houses and couldn't do that until May 1976.

c p: Because of a lack of facilities?

McKissick: Not the water and the sewer, but the Mandate of HUD kept us from building. We couldn't sell houses or be involved with building them due to their definition of us as land developers. My first plan when I went to Washington with this program was to get an allocation for fifty housing units from the Department of Agriculture. That was when we first started. We were announced at a joint press conference with Orville Freeman, then Secretary of Agriculture. Then the other agencies and acts got into it along with the Agriculture Department. And it was decided that since HUD had jurisdiction over the enabling Act and that it was more comprehensive, all the things required could be provided through them rather than part here and part there. That's the reason we were with HUD. We never even went

there directly - the Agriculture Department referred us. They were ready to give us the housing units and that's what I had gone after. They would have been used for the rural population; we would have set up a corporation and used a house as an office, and put a mini shopping center with them. It takes time to build things up. This was a bad place to come for a quick buck.

c p: But over the long range you expect to make money?

McKissick: This could be profitable. The Soul City Co. is set up to be marginally profitable after seven or eight years, but that's if the area achieves great value. James Rouse's companies don't always make money either.

c p: Is Soul City modeled after his development?

McKissick: It's the same kind of partnership, but Columbia has no federal assistance. It's a private development with freer decisions. Here we are very restricted as to how we spend our money. For example, this is a very nice building (Soultech I, 73,000 square feet), but had it been left to me, I would not have built it of this size and structure. Housing would have been first, then smaller industries could have set up.

c p: If HUD does pull out, would this be a viable private development?

McKissick: Yes. If the government wants to pick up their marbles and go home, OK, but don't pick up my marbles! I'll stay here and continue doing what I said I would do. I've spent ten years of my life here and the time and resources of my family.

c p: Is it feasible from a capital availability standpoint?

McKissick: I think we can raise the capital; we've gotten letters of support from all over the country.

c p: Would that actually be better then, as it wouldn't be so restrictive?

McKissick: That's a point. The government may give a lot of money, but they tell you how to use and misuse it and blame you for it. They never know the local political structures and nuances, the Southern Who's Who, and they don't make allowances for those things. With them calling the shots, we can't deviate from a pattern and it allows no flexibility. That's a great criticims of government run operations. In some instances, I would have practically given away certain land to key people in order to create value in land to bring people in as inducements. Hell, I wouldn't hire a big company out of California to do a study here (as was indeed the case). I would go to the Research Triangle or Raleigh or Durham. There's talent and knowledge there. That's a key element in this whole project - creating jobs and boosting the economy regionally.

c p: Even though HUD is saying a cut-off of funds is eminent, you are saying this project will go on?

McKissick: I'm not ready to give up by any means. The thing is, we have accomplished our objectives. No one believed we would do this much. Housing, we get financed in spite of HUD. They were supposed to give us 100 units of housing, but didn't. That has impacted upon our industrial development, i.e., affected us negatively. Where are we going to put the people who would work in a factory here? These people we are trying to work with are all hung up with which comes first. If you agree under this Act (Title VII) to go forward, all things move concurrently. And you save money like that too.

c p: Has HUD's announcement affected adversely your continuing efforts to attract industry to Soul City?

McKissick: It was a great awakening for these people who had read one thing in the paper to come here and find something else. They were astonished at how unfarily things were represented.

c p: What do you think of federal policy toward new towns?

McKissick: It's a good program and it can work. It's on the books and it'll be back again. It's a program that re-

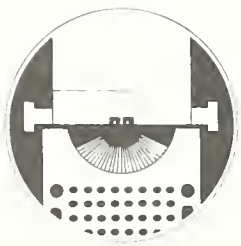
quires innovation and can't be administered by bureaucrats. It must be a consolidated effort too, not an on-again-off-again thing. The Europeans have done it successfully - even in India and Africa, there are new towns, so it really isn't new. The quality is what is important. If the government put some of its contracts with industries into a new town - if they said to Chrysler, see what the capabilities are of this new town to produce our tanks or whatever, the whole new communities program would benefit from the 'business of America." With the cooperation of federal agencies, we could do it.

c p: Do you have other specific ideas on how federal policy should be changed?

McKissick: They should get someone out of the industry to come in and do it. But once that's done, someone is yelling 'conflict of interest." You have to examine if it's to the detriment or benefit of the man and the town. Someone with an interest wants it to work more and will work harder for it. I've got an interest here and I always work overtime; I believe in what I'm doing, otherwise I wouldn't be here. If I wanted just to make money, God knows I wouldn't be here. There's far more money elsewhere. I am concerned and hope we can reach a satisfactory agreements with HUD so that they can get out and we can continue. The government can't have lost money according to the mathematics. The grant monies would have been spent at any rate and the guarantees will be justified by only one industry that provides 300 jobs.

This interview was conducted on 19 October, 1979 at Soul City, North Carolina. In December, Perdue, Inc., of Salisbury, Maryland, a poultry products industry, announced the acquisition of 500 acres just south of Soul City, in Manson County. There will be an initial investment of $20 million, with an estimated 1000 jobs. Although this seems fortunate, a tentative agreement for the Federal government to acquire Soul City was reported in the Durham Morning Herald (12 December, 1979) to take effect 8 January, 1980.

Forrest G. H. Sadler
Associate Editor
carolina planning



Letters

THE GREENVILLE CCEM

Last year, Greenville, N.C. was chosen as one of twelve cities in the nation to be awarded a grant from the U.S. Department of Energy for development of a Comprehensive Community Energy Management Plan (CCEM). Although there are a number of cities (Davis, Calif.; Portland, Ore.; Franklin County, Mass.) in the forefront of energy planning to provide models for CCEM plan development, there has been only limited experience with such programs in North Carolina. This CCEM program, which is being directed by Greenville Utilities, will provide the opportunity to systematically consider energy management strategies tailored to Greenville's peculiar needs. Greenville was the smallest city chosen for the DOE program, and the only CCEM program to be administered by a utility company. This relationship carries with it some interesting implications.

Traditionally, utility companies have been charged with the responsibillty of providing as much energy as needed at a regulated rate. If keeping pace with increasing consumption requires the construction of additional generating capacity or increased prices, the utility companies have been willing, and some believe anxious, to expand their services. The Tennessee Valley Authority (TVA), a federally-managed utility, was the first to demonstrate that the promotion of energy conservation and decentralized energy services can be most cost-effective for both the utility and the customers.

Greenville Utilities, which is a municipally-owned utility responsible for purchasing and distributing electricity and natural gas for the Greenville area, has had an Energy

Conservation is an important part of an energy management strategy.
DOE photo by Jack Schneider.

Conservation Division since the mid-1970s. Under the direction of the Conservation Office, a peak-load management program was implemented to encourage customers to reduce electrical consumption during peak hours. Since Greenville Utilities simply purchases and distributes, rather than generates electricity, it will have much more flexibility in choosing and promoting alternative energy systems than most private utilities.

The CCEM program follows a logical sequence of steps. The first step was to find out how much and what type of energy the Greenville Community is currently using. The energy audit provides the information needed to target attention on the most vulnerable and energy inefficient sectors. For instance, Greenville energy audits, completed at the end of 1979, showed that the residential sector accounted for one-third of the total community energy consumption in 1978. Transportation, which includes personal, commercial, and local government automobile travel, was.the second largest consuming sector, using 23% of the total energy input. This differs from the statewide and national patterns of energy consumption, which are both dominated by the industrial sector. The results, however, are not surprising since Greenville has a relatively low industrial concentration and a large university-associated population (East Carolina University).

More interestingly, we discovered that 83% of the total residential energy consumption (1,590 billion BTUs/year) is used in single-family detached households, and over half of that energy is being provided by oil. This information makes it obvious that energy conservation measures and promotion of renewable energy sources, such as passive and active solar, wind, wood, and other biomass sources, could make a significant contribution to the goal of energy self-reliance in Greenville.

Now in the second phase of its CCEM program, Greenville is setting community goals and objectives for managing energy use. By eliciting community input about concerns and expectations regarding energy, we hope to narrow the scope of possible alternatives to those policies which are tailored to the attitudes of Greenville's residents. To be workable, the community energy plan must be accepted.

At the completion of that process, we will begin an indepth impact analysis on a number of promising alternative strategies. Possible strategies include district heating and cooling, a private or municipally-owned co-generation plant, changes in land use planning policies and regulations to allow for solar easements, revision of the transportation network, and promotion of pedestrian and bicycle traffic. Each option will be analysed to determine what changes in consumption patterns are needed, what it will cost, what impact it will have on the community's economy and environment, and finally, how much non-renewable fuel it will save. The final step in Greenville's CCEM program will be the adoption of an implementation plan which outlines the organization and tools necessary to carry out the final selection of strategies.

As logical and straightforward as the process may seem, our experience as consultants for Greenville Utilities CCEM program has made us realize that creating an energy efficient society is much more than a step-by-step process. Greenville, like most other American cities, has some "unplanning" to do. They must unplan the community development and consumption patterns that were based on cheap energy of the past. Greenville Utilities must redefine its role from energy provider to the role of provider and promoter of energy efficient services, both centralized and decentralized. Despite the pains of learning, Greenville's program is one that planners in North Carolina and the Southeast should follow closely. For those interested in the development and outcome of the CCEM program, contact Reese Helms, Director of the Conservation and Management Division of Greenville Utilities.

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North Carolina's Public Power Systems Choose the "Hard" Energy Path

In his widely-read article, "Energy Strategy: The Road Not Taken?" Amory Lovins (1976:65) describes two alternative energy futures for the United States, which he terms the "hard" and "soft" paths. The "hard" path, which would continue present trends, "relies on rapid expansion of centralized high technologies to increase supplies of energy, expecially in the form of electricity." The "soft" path, in contrast, would combine "a prompt and serious commitment to efficient use of energy" with "rapid development of renewable energy sources matched in scale and in energy quality to end-use needs." (Lovins, 1976:65).

Lovins' soft energy path would have a number of advantages for meeting energy needs in the State of North Carolina. There would be economic advantages, moral or ethical benefits, and better coordination of state policy. However, despite these advantages, a number of the state's public power systems have recently chosen the "hard" path by investing in large, centralized nuclear generating plants.

There are two types of publicly-owned electric supply systems in North Carolina: rural electric cooperatives, also known as Electric Membership Corporations (EMCs), and municipal electric utilities. The individual EMCs are organized into a state-wide cooperative, the North Carolina Electric Membership Corporation (NCEMC), while a group of nineteen municipal electrics form a public corporation called North Carolina Municipal Power Agency #1 (NCMPA #1). On November 29, 1978, NCMPA #1 completed the purchase of about one-third of Duke Power Company's Catawba nuclear electric generating station. Earlier in the year, on April 14, NCEMC had signed a letter of intent with Virginia Electric Power Company (Vepco) to purchase a share of two of Vepco's new nuclear power plants over the next seven years.

According to Lovins (1976:96), the hard and soft energy futures are mutually exclusive:

> Enterprises like nuclear power are not only unnecessary but a positive encumbrance for they prevent us, through logistical competition and cultural incompatibility, from pursuing the tasks of a soft path at a high enough priority.

Seen from this perspective, the public power systems' decision to invest in nuclear power represents an irrevocable commitment to the hard energy path. This paper will attempt to analyze that decision in a larger context by first identifying the advantages of a soft energy path for North Carolina, which should have led the public and private power systems to choose this future. Next, the ideal soft choice will be contrasted with the actual events leading up to the Catawba purchase and the letter of intent with Vepco. Finally, some of the broader implications of public investment in private utilities will be discussed.

ADVANTAGES OF THE SOFT ENERGY PATH FOR NORTH CAROLINA

ECONOMIC ADVANTAGES

Lovins (1976:80) argues that "appropriate" energy technologies, matched in scale and location to end-use energy needs, "can achieve important types of economies not available to larger, more centralized systems." These economies include reduced overhead and distribution costs, increased reliability of small systems, less inflation of capital costs due to shorter lead times for system construction, and the ecomomies offered by mass production of system components. Perhaps the most important of these economic advantages of small-scale energy technologies is that of increased reliability. In 1977 testimony before the U.S. House of Representatives Subcommittee on Environment, Energy, and Natural Resources, Lovins (1977:4) cites Edison Electric Institute statistics showing that forced outage rates (periods when a plant is shut down for repairs) are typically 2-3 times lower for small (200-400 MWe) fossil-fueled electric generating plants than for fossil or nuclear plants over 600 MWe.

In his testimony, Lovins notes that when a large power plant is closed down for repairs, a large amount of generating capacity is lost. Therefore, these plants must be constructed with a large "reserve margin" of backup capacity.

Margaret Hilton will complete the MRP program at the University of North Carolina in May, 1980, with a concentration in energy planning. *This article provided the basis for a research proposal to the North Carolina Energy Institute and the Southeastern Solar Energy Center.*

Smaller generating plants, as noted above, are less likely to require repair shutdowns. In addition, it is unlikely that several small generating plants would break down at the same time. Because of this, a system of several smaller plants requires less total reserve capacity (and hence less overall capacity) than would be required for a single large plant of equal size: Lovins cites a 1977 study by the Wisconsin Public Service Commission which showed that three 400 MWe coal plants could deliver a given amount of electricity at a given level of reliability equal to the amount delivered by two 900 MWe nuclear plants. (Lovins, 1977, p.4, footnote 17). This large saving in total generating capacity required makes a system of smaller plants much more cost-effective than a single large plant.

"ACCORDING TO LOVINS, THE HARD AND SOFT ENERGY FUTURES ARE MUTUALLY EXCLUSIVE."

In addition to losing the economies offered by the increased reliability of smaller, decentralized power plants, North Carolina's public power systems have lost the economic advantages offered by less inflationary impact of a shorter period of plant construction: The total cost estimate for NCMPA #1's purchase of a portion of the Catawba plant increased from $848 million to $915 million over the course of one summer due to inflation and the need for additional safety equipment.

ETHICAL ADVANTAGES

A soft, decentralized energy future may have moral or ethical value for individuals in North Carolina as well as economic benefits. According to E.F. Schumacher (1973:31), modern capitalist society is "propelled by a frenzy of greed." He goes on to say that the continuation of this centralized economic system, which rests on individual self-interest, will adversely affect the individual: "If human vices such as greed and envy are systematiclaly cultivated, the inevitable result is nothing less than a collapse of intelligence." (Schumacher, 1973: 31). This will result in a waste of "the human substance," which Schumacher views as the most important component of society's "natural capital." (Schumacher, 1973:20).

To avoid this waste of the human substance, Schumacher proposes that technology and society be reordered and decentralized. He argues that society needs methods and equipment which are:

- -cheap enough so that they are accessible to virtually everyone;
- -suitable for small-scale application; and
- -compatible with man's need for creativity (Schumacher, 1973:34)

According to Schumacher (1973), the use of such methods and equipment, "technology with a human face", will alow people to enjoy themselves while they are working and result in a society of nonviolence and permanence.

The use of small-scale, decentralized energy technologies by North Carolina's public power systems could give local citizens a chance to become involved in producing their own energy supplies. Individuals' creativity could be channeled into the development of innovative, small-scale technologies. In addition, decentralized systems using renewable energy resources would result in Schumacher's "relationship of man to nature which guarantees permanence." (Schumacher 1973:34). Instead, some public power systems have chosen to invest in privately-owned, privately-managed nuclear power plants, which they neither understand nor control and which are located far from the citizens they are intended to serve.

COORDINATION OF STATE POLICY

North Carolina's population is presently distributed across the state in a variety of settlements ranging from small villages to five major cities of over 150,000 persons. Of the state's 1970 population, 55 percent lived in rural areas, with the majority, classified as "rural non-farm," residing in villages and small towns. (Clay, et. al., 1975:34). In order to maintain this population distirbution, Governor James Hunt has led the state government in developing a "balanced growth" policy.

Under the balanced growth policy, state and local officials would designate municipalities of varying size in each region of North Carolina as "growth centers." State and federal funding would be channeled to each center to build up its infrastructure and hence its ability to assimilate economic growth. In addition, state industrial recruitment efforts would focus on these growth centers: one state official described the policy as an attempt "to match the industry with the community" (Vass, 1978:12).

The decision to invest in hard power sources may curtail development of other alternatives. Photo by Omaha Public Power District.

By distributing industries across the state, thus providing "more and better jobs to where people live" (N.C. State Goals & Policy Board, 1978:ii), the policy would maintain the present, decentralized pattern of population distribution.

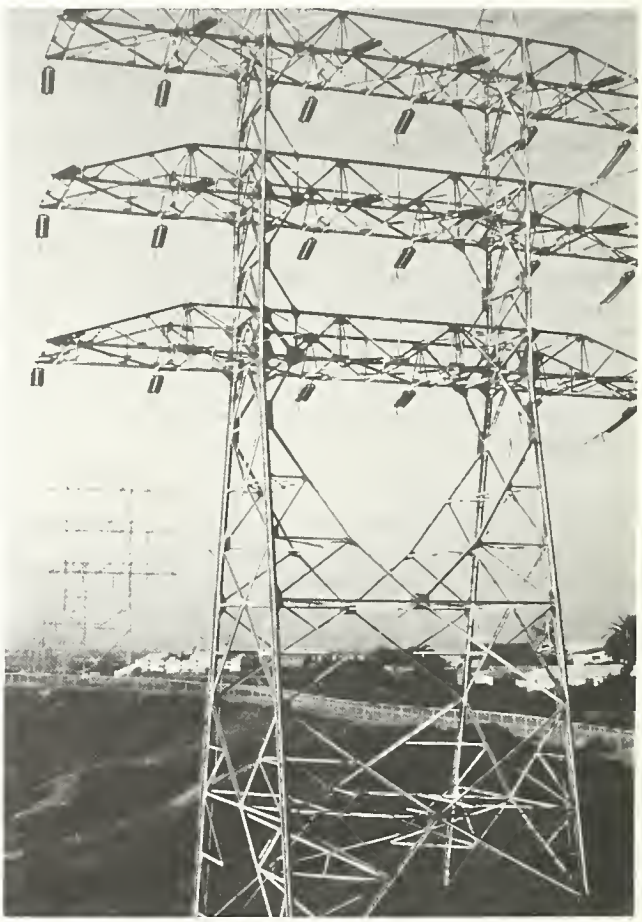
The problem, then, is how best to supply this dispersed population with energy. If the balanced growth policy accurately reflects the desire of North Carolinians to maintain "the small, more liveable scale of our cities and towns" (N.C. State Goals & Policy Board, 1978: iii), then energy supplies should also be kept to a small, liveable scale. The state should seek not only to "match the industry with the community" but also to match an appropriately-sized energy supply with both the industry and its community. According to Lovins and Schumacher, this matching of energy supply with population would combine both economic advantages. However, state policy does not encourage this soft, decentralized path, and has left both the private and public power systems to choose centralized, nuclear power.

"THE STATE'S ELECTRIC MEMBERSHIP CORPORATIONS WERE CREATED FOLLOWING PASSAGE OF THE RURAL ELECTRIFICATION ACT."

CHRONOLOGY OF EVENTS IN THE NUCLEAR PLANT PURCHASE

Thomas Edison first demonstrated the feasibility of central station electric power generation in 1882. At that time, both municipalities and private companies became involved in the business of generating power. In North Carolina, a number of municipalities constructed and operated electric generating plants in the early 1900s, but most of them later found it more economically prudent to purchase power from the private utilities (ElectriCities of North Carolina, 1978). The State's Electric Membership Corporations were created following passage of the Rural Electrification Act by Congress in 1936. Under the Act, low-interest loans were available to municipalities, cooperatives, and investor-owned utilities for the purpose of producing and/or distributing power in rural areas. The money, which was channeled through the Rural Electrification Administration (REA) in the Department of Agriculture, was used primarily by the newly-created non-profit rural electric cooperatives.

In anticipation of the federal electrification program, the North Carolina legislature approved enabling legislation for the Electric Membership Corporations in 1935. At that time, the high cost of *distributing* power to dispersed rural populations was seen as the key problem in rural electrification (N.C. Electric Membership Corporation, 1978). Perhaps this emphasis on power distribution rather than generation explains why REA, in 1949, denied a loan to a federation of eastern North Carolina EMCs to construct their own generating system. The money was denied on the basis that Carolina Power & Light offered lower rates. Like the municipalities, North Carolina's EMCs were distributors, rather than generators, of electric power.



There are 28 Electric Membership Cooperatives distributing power to rural consumers in N.C. DOE photo by Jack Schneider.

At the present time, nearly all of North Carolina's electric power is produced by three major private utilities: Carolina Power and Light, Duke Power, and Virginia Electric Power Company (Vepco). There are now 28 EMCs which purchase most of their power from these companies and distribute it to about 409,000 rural customers (N.C. Association of Electric Cooperatives, et al., 1978:17), or about 7.2 per-

cent of the state's estimated 1978 population of 5,679,000 (N.C. Division of State Budget & Management, 1978, Table 26). Of the state's 72 municipal electric systems, only one, Fayetteville, has its own generating capacity (peaking plants), while the rest purchase both base and peak load power. Together, these "electric cities" distribute power to over one million customers (ElectriCities of North Carolina, 1978), which is approximately 17.6 percent of the state's 1978 population.

The 1950s and 1960s were an era of cheap power in the United States, as fuel prices were kept artifically low and economies of scale in centralized electric power generation were captured. By the early 1970s, fuel prices started to increase, and economics of large-scale electric generation started to disappear, but the small municipal electrics and rural electric co-ops were just getting onto the large-scale bandwagon.

A brochure sent out by the American Public Power Association, a national lobbying group, in 1974, stated in part:

> Over the past few years, generation, and transmission facilities have become larger as 'economies of scale' have made it less costly to generate electricity in large than in small plants. Local public power systems have taken, and will continue to take advantage of technological improvement...Recent legislative, regulatory agency, and court decisions have made it clear that small systems have the right to share, on an equitable basis, in the ownership and output of large facilities built by neighboring power companies. (American Public Power Association, n.d.:7)

This group saw "joint action" with the private utilities as a means of capturing economies of scale and keeping costs lower. No doubt North Carolina's EMCs and electric cities, like other local public power systems, were influenced by this argument.

"INDIVIDUALS' CREATIVITY COULD BE CHANNELED INTO THE DEVELOPMENT OF INNOVATIVE, SMALL-SCALE TECHNOLOGIES."

Along with other public and private electricity suppliers, North Carolina's public power systems began to feel the pinch of escalating costs in the late 1960s. Their first response was an attempt to develop an independent electricity supply. In 1970, after two years of negotiations, 45 electric cities and 30 of the 36 EMCs then in existence joined to form a non-profit corporation called EPIC (Electric Power in Carolina) (Aulic, 1978:32). The group planned an extensive electric supply system consisting of a pumped storage hydroelectric plant in the mountains, one coal-electric and one nuclear generating plant in the Piedmont, and a nuclear plant in the norhteast coastal area. These four plants and three substations were to be linked by a 500-KV transmission line.

At the same time that the public power systems were investigating their own source of supply, the state's private utilities were beginning to investigate the possibilities of joint ownership with the public systems. The attractiveness of low-interest financing by the public power systems had increased as the utilities' capital costs soared during this period. In 1973, as construction of the Catawba nuclear station was beginning, Duke Power Company began to discuss the possibility of joint ownership with the North Carolina Electric Membership Corporation and ElectriCities, the state-wide organization of municipal electric utilities (Bishop, 1979).

In 1974, the North Carolina Supreme Court ruled that the legal uncertainties surrounding joint construction of generating facilities by EMCs and municipalities made the EPIC plan "so premature that the matter was not an appropriate issue for decision" (Aulis, 1978:32). While the EPIC plan died with this decision, both the public power systems and the private utilities were still interested in the possibilities for joint action. In the same year, ElectriCities participated in the drafting of a bill which would allow any two or more municipal electric systems to jointly engage in electric generation or transmission.

During 1975, the Joint Municipal Electric Power and Energy Act was passed by the State Legislature, and Duke Power made a formal proposal to sell one of its two Catawba units to its municipal customers. This proposal spurred the decision, in January 1976, to form an independent corporation to enter into negotiations with the company. NCMPA #1 was created by the 22 municipal electric systems served by Duke, and negotiations were begun. Later that year, the municipalities served by Vepco formed NCMPA #2, and in December, NCMPA #3 was formed by electric cities in the Carolina Power and Light service area. It was around this time that NCEMC's discussions with Duke began to break down, and the organization entered into negotiations with Vepco to purchase a portion of its generating capacity.

In November of 1977, the final legal barriers to joint ownership with the private utilities were removed. After an "aggressive campaign" over the summer, funded by a special assessment on members of ElectriCities, North Carolina voters approved Amendment 4 to the North Carolina Constitution (ElectriCities of

North Carolina, 1978). This constitutional amendment granted the municipal electric systems and the EMCs full authority to jointly finance generating and/or transmission facilities with both the private utilities and other electric cities of EMCs.

With the granting of full legal authority, the planned joint ownership projects went ahead in 1978. On January 31, NCMPA #1 signed a letter of intent with Duke Power to buy 75 percent of one of the two 1145 MWe generating units and 37.5 percent of the support facilities at the Catawba nuclear station. Later that year, on April 14, representatives of NCEMC and Old Dominion Electric Cooperative (an organization of Virginia electric co-ops) signed a similar letter of intent with Vepco.

Under the NCEMC-Vepco agreement, the cooperatives would immediately purchase a portion of Vepco's Surry Nuclear Station in Surry County, Virginia. When construction of the North Anna Nuclear Station, located in Loisa County, Virginia, is completed, the co-ops would also own a share of that plant. The agreement calls for a total purchase of 67 MWe of generating capacity for a price of around $51 million (*Carolina Country*, 1978:8).

By June of 1978, NCMPA #1 had grown to 20 member cities, 19 of which had signed contracts with the agency (NCMPA). These "take or pay" contracts ensured that the cities would pay for the cost of operating that portion of the Catawba plant which NCMPA #1 planned to purchase (around 640 MWe). On November 28, 1978, NCMPA #1 sold $400 million in electric revenue bonds to raise the required capital, and on November 29 the final purchase for the power was made.

CONCLUSIONS

The events of 1978 indicate that the nineteen municipal electric utilities now included in NCMPA #1 have indeed chosen a hard energy path which will prevent them from investing time and money in other, more appropriate technologies. The first $400 million in bonds has been sold, and another $500 million, at least, will be added to it. The small towns which are financing this venture cannot afford to seek further investments even in decentralized energy supplies. Thus, these particular public power systems will not serve as a model to the state's private (or public) electric utility industry, demonstrating the economic competitiveness and other advantages of small-scale, decentralized power generation.

The world's largest wind turbine, located in Watauga County, N.C., was built with DOE funds. *DOE photo by Dick Pebody.*

Another issue related to the Catawba purchase is that joint ownership by private and public generating systems removes the traditional competition between the two. Without competition from the rural electric co-ops, North Carolina's private utilities would never have entered the less profitable markets. If all of the state's public power systems invest in joint action with the utilities, there will no longer be an impetus for regulatory hearings from public power distributors seeking lower rates from the private companies. Thus the private utilities will lose their incentive to keep wholesale electric rates reasonably priced and distribute power in rural areas.

Whether the state's remaining electric cities choose the hard path remains to be seen. There is every indication that they will do so, since the remaining two municipal power agencies are negotiating with Vepco and Carolina Power & Light. However, it should be noted that NCMPA #2 considered constructing its own peak-load plants, but found it would be economically infeasible when the City of Greenville, its largest member, decided to concentrate on load management, conserving existing supplies, rather than construction (ElectriCities of North Carolina, 1978). It appears that Greenville has chosen at least one element of the soft path. In addition, Amendment 4 allows the electric cities to finance construction of new facilities, either jointly or with the EMCs. Thus, any group of two or more cities could choose to develop an independent supply, and an EPIC-type project could be revived.

The state's twenty-eight EMCs stand at a crossroads: although they have signed an agreement with Vepco, they have not yet made a financial commitment. The length of time since the signing (one year at the time of this writing) casts serious doubts on the completion of the proposed purchase. In addition, NCEMC is investigating the possibility of building a 600 MWe peat-fired electric generating plant at First Colony Farms in Washington County (Carter, 1978). The Blue Ridge EMC in Watauga County will soon be operating a 2000 KWe wind generator, designed by NASA and built with DOE funding (Ayers, 1979). Finally, Randolph EMC in Randolph County is investigating the feasibility of generating hydroelectric power at an old mill site (Hussey, 1979), and a number of EMCs are operating load management programs. The EMCs may yet choose the soft path.

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Tom Vass

Low Wages and Industrial Development: North Carolina's Economic Predicament

In a recent book on the role that economic theory plays in the development of public policy, John Kenneth Galbraith (1973:7) suggested that the prevailing economic thought in America tends to serve the instrumental purposes of the most powerful economic organizations in society. Galbraith explained that there did not seem to be either formal collusion or covert alliances between powerful economic interests and proponents of the current economic dogma, rather he said that it just so happens "that the image of an earlier society serves admirably the instrumental purposes of a later one....What seems like a decent intellectual conservatism became powerful support to economic interests" (Galbraith, 1973:8).

During the twentieth century, governors of North Carolina have used a variant of contemporary economic theory to justify a public policy of recruiting outside capital, in the form of manufacturing plants, to the State in an effort to alleviate the social problems of unemployment and poverty. While expressing optimism in the ultimate success of this public policy, the governors of North Carolina have also expressed considerable concern over the State's continuing low per capita income and low hourly industrial wage ranking relative to other states.

The same economic theory upon which North Carolina's public policy of industrial recruitment is based also serves to explain the persistence of North Carolina's low wages. What seems like a decent interpretation of economic reality has become a convenient defense of an indecent relationship between the work that North Carolina's workers perform and the wages the workers receive for their efforts.

There are serious defects in the public policy of industrial recruitment due to a misperception of the power and purposes of large multi-national corporations. There are theoretical and methodological deficiencies in the explanation of low wages in North Carolina based on the current model of competitive neoclassical general economic equilibrium. Finally, there is nothing admirable about the role resident North Carolina economists play in explaining and "defending" the status quo (Vaden, 1979). This paper argues that North Carolina's economists might more usefully serve the public purpose by offering critical insights into persistent social problems. The first section of this article briefly reviews the history of the concerns that twentieth century governors of North Carolina have had with industrial recruitment, education, and low wages. The second section treats the deficiencies in current economic theory, while the

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third section of the paper outlines a more plausible theory of economic phenomena in North Carolina.

A BRIEF HISTORICAL REVIEW

Every North Carolina governor in the twentieth century has held three concerns in common with the others: a concern for promoting industrial growth, which is usually expressed by a recitation of impressive economic growth statistics, qualified by a statement on the need to attract outside capital to the state; a concern for education and training; and a concern that per capita incomes and industrial wages are low, relative to other states.

For example, Governor Bickett (1917-1921), in a speech delivered to the North Carolina Society of Pennsylvania on December 4, 1920, bragged that North Carolina was second in the world in the manufacture of cotton goods; that Winston-Salem manufactured more tobacco than any other city in the world; that Canton had the largest wood pulp mill in the world; that High Point was second, next to Grand Rapids, in production of furniture; that Badin had the second largest aluminum plant in the world; that Kannapolis had the largest towel plant in the world; that Durham was the center of the

"THERE ARE SERIOUS DEFECTS IN THE PUBLIC POLICY OF INDUSTRIAL RECRUITMENT..."

largest hosiery industry in the world; and that Greensboro had the largest denim mill in the world (Bickett, 1923:215). In a later speech on education, Governor Bickett (1923:239) warned that "if we are to take our rightful place in the march of progress and in the scale of civilization, we must so train the heads and hands of our people that to the pound of raw material that everywhere abounds they will be able to add the five cents worth of brains."

Governor Bickett's warning was echoed by Governor Morrison (1921-1925), who said that "The curse of North Carolina through the ages has been its unwillingness to spend money in necessary development of the natural resources of the State, and in training and making efficient the great mass of the people. For many decades we were 'Hewers of wood and drawers of water' for the better trained and more efficient sections of our own country and of the world" (Morrison, 1927).

Governor McLean (1925-1929), touched two of the three concerns in his Biennial Message to the General Assembly in 1927, when he stated that "North Carolina neither baits nor coddles big business. Every honest enterprise is encouraged and is justly treated by our state government in the enactment and administration of our laws. On account of this fair and just attitude toward outside capital, our State has in the past twenty-five years shown a greater rate of progress in industrial development than any state in the Union" (McLean, 1931:73).

Ten months after delivering the Biennial Message to the General Assembly, Governor McLean (1931:397) spoke on the relationship between education and economic growth and said, "One of the principal reasons why North Carolina has made such unprecedented progress in industrial development these last twenty-five years is because the state government, backed by public sentiment, has pursued a helpful and liberal policy toward capital, not only that furnished by our own people, but also that which has come from the outside for investment in our State."

While the twentieth century governors of North Carolina have pointed with pride to economic growth statistics, it has always been a gesture accompanied by an undercurrent of concern with North Carolina's poor performance in personal incomes and wages. One of the earliest and most explicit statements of concern for low per capita incomes came during the administration of Robert Cherry (1945-1949). In Governor Cherry's second Biennial Message to the General Assembly on January 9, 1947, Cherry (1951:52) stated that "a vigorous campaign has been carried on, aimed at attraction of new industries to the state. Many direct contacts with out-of-state industrialists and an aggressive follow-up campaign have brought results....In spite of this increase in employment, due to low per capita income, North Carolina in 1945 ranked forty-first among states in per capita income."

It is of interest to note that Governor Cherry also announced a balanced growth policy to "keep and maintain a good balance between industry and the land." In contrast to contemporary notions of balanced growth based on industrial recruitment, Governor Cherry's

"LABOR ITSELF WAS RESPONSIBLE FOR ELIMINATION OF WAGE DIFFERENCES"

program called for the establishment of small, community-based, rurally located industries, built with local capital, local labor and local raw materials. The goal of the program was "a great number of new businesses, born of our own money and brains, and pretty closely related to our agricultural life in this state" (Cherry, 1951:552).

Governor Luther Hodges (1954-1961), often chronicled North Carolina's economic growth

and called for balanced industrial growth through recruitment of outside capital. On one occasion, after citing a number of impressive growth statistics and reviewing the poor indicators of North Carolina's per capita income from 1929 to 1953, he put the growth statistics into perspective with the remark that "Naturally, we have made a lot of progress in the last twenty-five years, but so have our neighbors. We have had to make a lot of progress just to stand still" (Hodges, 1960).

The high rates of economic growth, based on capital investments in manufacturing plants, and the persistence of low wages in North Carolina compared to the rest of the United States seems inconsistent with the predictions of widely accepted economic theories of competitive economic equilibrium. These theories predict that competitive forces in the markets for factors of production and for finished goods would tend to reduce regional differences in wages and incomes.

PROBLEMS WITH CONTEMPORARY THEORETICAL EXPLANATIONS OF THE WAGE GAP

Competitive general economic equilibrium theory predicts that market forces will eliminate differences in wage payments to labor both in different industrial sectors and in different geographical locations. The elimination of differences in wage payments arises partially out of labor's own response to differences in wages, and partially out of fundamental economic laws of profit maximizing behavior which direct that competing factors of production be employed up to the point where the marginal costs of the factors in producing a given output are equal.

The idea that labor itself was responsible for elimination of wage differences between areas and industries was most clearly stated recently by Dr. George J. Stigler (1966:257):

> Competition tends to eliminate differences in rates of wages for similar workers in different occupations and geographical locations; for the worker who is in the job where wages are low will move to the higher paying job. This movement will raise wages in the market the workers are leaving and lower them in the market the workers are entering.

The idea that fundamental economic laws will work to eliminate wage differences was described by Alfred Marshall (1949:662), who said:

> By means of this combined vertical and horizontal competition there is an effective and closely adjusted balance of payments to services as between labor in different grades... the principle of substitution is constantly tending by indirect routes to apportion earnings to efficiency between trades, and even between grades, which are not directly in contact with one another, and which appear at first sight to have no way of competing with one another.

Marshall (1949) was carefully insistent in reminding his readers that wages tended to equal the net product of labor and that the marginal productivity of labor ruled the demand price for it. He was also careful to note that competition tended to adjust wages of workers according to the workers' efficiency.

General economic equilibrium theory predicts that competitive forces in the market will eliminate wage differences, and clearly identifies the marginal productivity of labor as the most important variable in the determination of wages. If wage differences between two areas or between various industries persist over time, either the market is not competitive, or the workers in different areas have different marginal productivities, or the theory is incorrect.

In recent attempts to explain the persistence of wage differences between North Carolina workers and workers elsewhere in the United States, resident North Carolina economists have identified some of the following

Employers may be able to match unskilled workers with sophisticated machinery.

factors as explanatory variables: lower cost-of-living , under-reported earnings of farm residents, loss of income due to unemployment, age distribution of the population, length of education, quality of education, lower fringe benefits, the race and sex composition of the

"CORPORATIONS MAY BE ABLE TO MATCH UNSKILLED WORKERS WITH SOPHISTICATED MACHINERY, AND CONTINUE TO PAY VERY LOW WAGES..."

labor force, lack of unions, lack of training, differences in city size, differences in industrial structure, the past acricultural heritage of North Carolina, a larger supply of labor than demand for labor, poor skills of the labor force, and a higher quality of life. The relationship between several of these so-called explanatory factors and economic theory is obscure, and some resident North Carolina economists seem open to the criticism leveled by Wassily Leontief (1960:4) several years ago that "many statistical economists still seem to believe that a string of partial correlations, if spun sufficiently long, can in some way represent a system of general interdependence."

It seems obvious that a competitive general economic equilibrium explanation of differences in wages between regions or between industries would simply rely on comparison of labor's marginal productivity. However, the measurement of labor's marginal productivity depends on the amount and type of capital equipment employed in a production process, the particular form of management and organization in the production process, and the predominant social values regarding work. Since the issue of how to measure capital is unresolved, the measurement of labor's marginal productivity presents a nearly unsolvable theoretical problem.

As a way around the problem of measuring labor's marginal productivity, recent explanations of wage differences have relied on proxy variables such as "years of education of the population." Since North Carolina's average years of education of the population is lower than some other states, economists reason that North Carolina workers have a lower marginal productivity than workers elsewhere, and according to economic theory, should receive lower wages. Unfortunately, the direct, positive and causal relationship between years of education of the population and labor's marginal productivity is unproven, and would in any event, depend on a definition of labor's marginal productivity which did not rely on the concept of capital.

An additional criticism of contemporary theoretical explanations of the persistence of low incomes and wages in North Carolina is that the data used in statistical equations is sometimes inappropriate for the occasion, and the variables chosen to represent theoretical concepts are inadequate. For example, the "lower-cost-of-living" variable is used in almost all recent explanations of low wages in North Carolina. One study found that "our cost of living results indicate that cost-of-living averaged about 11% lower in North Carolina than in the United States as a whole. Thus, cost of living alone explains a large portion of the earnings differential between North Carolina and the overall United States" (Potthoff, 1977). A more recent explanation

"...ECONOMISTS REASON THAT NORTH CAROLINA WORKERS HAVE A LOWER MARGINAL PRODUCTIVITY THAN WORKERS ELSEWHERE..."

by a resident economist cited a study published in the *American Economic Review* (69(1):173) which found that "over 62 percent of the difference between southern and northern per capita money earnings is attributable to differences in living costs, as measured by BLS's intermediate level budget" (Bellante, in Fearn, 1979).

Comparison of differences in cost-of-living between states based on the Bureau of Labor Statistics periodical report entitled *Three Budgets of Living for an Urban Family of Four Persons* is an inappropriate use of data, as the economists who compile the BLS report will readily point out:

> Regional variations are incorporated into the food-at home component (of the family budgets) based upon regional consumption patterns as reflected in the U.S. Department of Agriculture's 1965 Household Food Consumption Survey. Larger weights are given to pork and lard in the south than in the northeast compared to larger weights for beef and butter in the northeast versus the south. In order to argue that these weight variations based upon regional consumption patterns are valid for use in a geographical cost of living index, the following questions would need to be answered. Would a representative individual be equally satisfied with either the southern or the northeastern market baskets of food when the southern basket contains more pork and lard and less beef and butter than the northeastern basket? Or is it the case that the different consumption patterns in the northeast and south might reflect differences in real income (Sherwood, 1977: 11)?

In other words, the BLS survey may incorporate differences in real incomes between the north and south as a part of its method of surveying, and therefore should not be used as data in an argument that it costs less to live in one state as opposed to another.

THE PROBLEM WITH INDUSTRIAL RECRUITMENT AND ANOTHER THEORY OF THE ECONOMY

The public policy of industrial recruitment is based on two simple theoretical propositions: first, low wage manufacturing work provides more income than either agricultural work or no work at all, and second, as the capital intensity of the production process increases, so will wages.

The problem with these two propositions is that they assume a benign and competitive economy, made up of many producers, none of whom influence the market price for factors of production or for goods, and all of whom seek to maximize profits. That assumption is hopelessly naive. Following Galbraith (1973:168), it seems clear that "Transnational corporations can produce or arrange production where costs are lowest...components for models being produced in the United States are assigned routinely, to the lowest-cost foreign plant." In the case of North Carolina, the lowest-cost foreign plant may be right at home.

In addition to assigning parts of the production process to low-cost plants, corporations may be able to match unskilled workers with

"...CORPORATIONS HAVE DEVELOPED A SYSTEM OF CAREER LADDERS WHICH INSULATES WORKERS FROM THE LABOR MARKET."

sophisticated machinery, and continue to pay very low wages. This possibility was raised by the U.S. Tariff Commission (1973:118) in its report to the United States Senate on multinational firms:

> The Tariff Commission reported that "not all" low-wage countries are primitive in the sense that they are unable to absorb and profit from techniques and disciplines of modern production. Furthermore, modern technology in some industries is such that relatively unskilled labor can be combined with fairly sophisticated equipment. This contradicts the stereotyped notion of "high technology" as a process in which highly skilled labor always must be available to operate advanced, complex kinds of capital equipment.

In other words, it seems possible that corporations could locate certain portions of the manufacturing process in a low-wage region, without disruption to the corporation's total system of economic production. What would otherwise appear as a high technology, high wage corporation from a national perspective, could become another low wage industry in a low wage region.

As an alternative to the contemporary theory of competitive general economic equilibrium, Galbraith(1978:7) has suggested a theory of planned general economic equilibrium:

> Instead we have an economic system which, whatever its formal ideological billing, is, in substantial part, a planned economy. The initiative in deciding what is to be produced comes not from the sovereign consumer who, through the market, issues the instructions that bend the productive mechanism to his ultimate will. Rather it comes from the great producing organization which reaches forward to control the markets that it is presumed to serve and, beyond, to bend the consumer to its needs. And in so doing, it deeply influences his values and beliefs...

This Galbraithian view of the economy is characterized by two typed of industrial organizations. The first, and dominant, industrial sector consists of corporations which maintain oligopoly influence in the market for their products, whose productive processes are highly capital intensive, whose use of scientific management techniques and application of scientific knowledge in both production and management is highly advanced, and whose training costs for skilled technicians and requirements for a stable and literate labor force are high. According to Galbraith (1978:77), the five largest corporations in this industrial sector in 1976, with combined assets of $113 billion, had just under 13 percent of all assets used in American manufacturing corporations. The economic planning undertaken by the dominant corporations has two key features; the ability to achieve a target rate of profit through price administration and an intricate system of the division of labor, including the ability to decentralize productive processes in branch manufacturing plants according to principles of market advantage.

The other industrial sector is composed of corporations which do not influence the demand for their products, and do not administer the prices for their goods. The productive processes in these peripheral industries are

less capital intensive, require fewer skilled workers and relatively more semi-skilled machine operatives than the dominant corporations, and consequently do not invest time and money in training their work force.

While the Galbraithian theory of the economy may help explain how the paradox of enormous capital investments by multi-national corporations in North Carolina are related to persistently low wages, it does not fully explain how the labor market in North

"MEASUREMENT OF LABOR'S MARGINAL PRODUCTIVITY PRESENTS A NEARLY UNSOLVABLE THEORETICAL PROBLEM..."

Carolina allocates jobs to workers. As in the Galbraithian view of the economy, the labor market is seen as split between jobs which offer secure employment, advancement opportunities, and good pay and jobs which provide considerably less. Workers compete, not on the basis of wages, but for available jobs. "One set of factors determines an individual's relative position in the labor queue; and another set of factors,not mutually exclusive of the first, determines the actual distribution of job opportunities in the economy. Wages are paid based on the characteristics of the job in question and workers are distributed across job opportunities based on their relative position in the labor queue" (Thurow and Lucas, in Atkinson, 1975:104).

The dominant corporations, as mentioned above, have invested heavily in the acquisition of scientific knowledge, and apply scientific knowledge and scientific management principles to the division of tasks in a production process. In order to preserve the supply of highly trained people in certain branches of the production process, corporations have developed a system of career ladders which insulates workers from the labor market and stratifies workers according to the advancement path of the job. The job clusters with advancement opportunities have different entry

"REQUIREMENTS FOR A STABLE AND LITERATE LABOR FORCE ARE HIGH."

requirements than other job clusters, with the highly technical jobs sectors organized to encourage job stability and attachment to the corporation. Less technical, or production line jobs, can be organized to permit highly unstable work behavior.

"Getting into the right job cluster has a critical effect on the training and advancement opportunities a worker receives" (Applebaum, 1979:45). In the case of North Carolina, the branch manufacturing plants located by dominant

The relationship between years of education and labor's productivity is unproven.

corporations may not require job clusters with career advancement opportunities. And, if the plants do require the highly skilled jobs, it stands to reason that the corporation will install a person already in the corporation's career ladder. It seems likely that the skilled person would come from outside North Carolina, thus effectively shutting off the entry into the career path by resident North Carolina workers.

ECONOMIC DEVELOPMENT AND MANPOWER PLANNING IMPLICATIONS

Alfred Marshall (1949:662) wrote in 1890 that "the dominant aim of economics in the present generation is to contribute to a solution of social problems." While the dominant aim of economics today is no different than in Marshall's time, it is difficult to see how this aim can be reached so long as the image of the economy in the minds of economists and planners is based on an earlier, more competitive economic society. In the areas of wage differentials and economic development policy, contemporary general economic equilibrium theory has made no accommodation to the changing role and power of multi-national corporations.

The theory of planned corporate economic equilibrium outlined above does accommodate

the role of corporations and would predict, for example, that a continued reliance on industrial recruitment would not close the wage gap between North Carolina workers and workers in other states. A public policy emphasis on dispersed location of manufacturing plants would tend to widen the gap both because the rural location of the plant would place the firm in a dominant, powerful wage bargaining position in a labor market with few competitors, and because the firm would probably demand the same level of skills as are currently held by the workers. In short, the management of a rurally located branch manufacturing plant does not have any social or economic reason to offer a level of wages in North Carolina comparable to wages in other states.

The policy prescriptions derived from the theory of a planned corporate economy would begin with the recognition that multi-national corporations have multiple objectives, and may seek to locate branch plants to further any number of its goals. The most likely

"...NEW INDUSTRY MAY BE IMPORTING SKILLED LABOR IN MIDDLE MANAGEMENT AND TECHNICAL OCCUPATIONS..."

objectives of the corporations are to achieve a target rate of growth in sales, a target rate of market penetration, a target rate of revenue over costs, or to accomplish other ends of a planned marketing strategy.

The two most probable reasons multi-national corporations find North Carolina an attractive location for branch manufacturing plants relates to the objectives of market penetration by foreign corporations in the U.S. market, or of U.S. corporations in the southern market, and to the objective of achieving a target rate of revenues over cost. The low cost labor, which has a long history of working with machines without interruptions due to labor unrest is conducive to consistent achievement of the corporate objectives. As long as it remains the official policy of the State of North Carolina to "provide a labor force *appropriately* trained for jobs in new industry" (Interim Balanced Growth Board of North Carolina, 1979:5), corporations will continue to use North Carolina labor to achieve the objective of a target rate revenues over cost.

However, low cost production is only one objective of large corporations. If North Carolina State Government desired to raise the level of wages of labor, it would examine other corporate objectives, and tailor a labor training policy which met both the State's objective of higher wages, and the other corporate objectives.

Some North Carolina leaders have recently been calling for a new strategy to deal with low wages, which incorporates a perception of the influence of multi-national corporations. For example, the North Carolina Commissioner of Labor has said, "the time has come for North Carolina to break away from the philosophy that because our unskilled workers can not meet the requirements for highly technical, high wage industry, a low wage job is better than no job at all. I would urge, for your consideration, a philosophy that skill training for every unskilled worker may be an integral intermediate step from an industrially poor state to an economically advanced state" (Brooks, 1979:7).

In order to meet this call for a new economic development strategy, regional economists and manpower planners should re-evaluate the theoretical and conceptual models of growth and development which underlies current economic and manpower planning practice. For example, manpower planners in the local Comprehensive Employment and Training Act (CETA) prime sponsors should recognize that new industry may be importing skilled labor in middle management and technical occupations, and should use CETA funds to demonstrate to upper level industrial management that local workers can be trained for these positions through a combination of classroom and on-the-job training.

Regional economists should work closely with industrial recruiters to the end that the new manufacturing industries in an area be able to purchase maintenance and repair services from local service industries. The task of the regional economist is to provide the industrial recruiters with information on

"...THE LOCAL PLANT MANAGEMENT MAY ITSELF BE INSTRUMENTAL IN MAINTAINING THE LABOR MARKET STATUS QUO."

likely inter-industry effects of industrial purchases. Once the potential need for air conditioning and heating services or industrial maintenance services are identified, manpower planners should use CETA funds to assist local employers to train mechanics in the required occupations. Such a training scheme would require that local manpower planners identify this activity in both the annual and master CETA plans.

In all planning activity, the regional economists and manpower planners should keep in mind the idea that branch manufacturing plants have located in the region to fulfill certain corporate objectives. Without proper evidence of the benefits of skill training, the local plant management may itself

be instrumental in maintaining the labor market status quo or even raise barriers to improving the skills of the labor force. Local management would do this not because they wish to deny workers better opportunities, but because they desire to fulfill the corporate plans of the head office.

The role of economic theory in developing the basis of a public policy of better jobs through skill training is to document the case that a skilled workforce is essential to the achievement of the multinational corporation's objectives. Rather than "explaining" the status quo of low wages, North Carolina's economists and planners should use economic theory to support the idea that North Carolina's workers and North Carolina itself can fulfill many different corporate objectives. The ultimate recipients of this economic evidence would be the people engaged in strategic corporate planning. The ultimate beneficiaries would be the thousands of North Carolina workers who continue to receive miserably low industrial wages.

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A-S-P Associates v. Raleigh: A Recent Court Test of Historic Preservation in North Carolina

In October, 1979, the North Carolina Supreme Court handed down a decision on one of the most significant land-use planning cases to be heard by that Court. Among the planning-law issues to be decided by the Court in A-S-P Associates v. Raleigh (1979) were the validity of historic district zoning, contextual standards for administrative issuance of permits, spot-zoning, validity of overlapping zoning districts, and the comprehensive-plan requirement. The decision represents a major victory for the historic preservation movement in the state, as North Carolina becomes the first Southeastern state to affirm the constitutional validity of historic preservation. The following article will discuss the context and nature of the decision handed down by the Court, as well as the implications for future planning practice in the state.

THE CONTEXT OF THE CASE

During the last decade, Raleigh, like many other cities, experienced rapid growth on its periphery and decline of its downtown residential neighborhoods. The Oakwood neighborhood, located directly East of the Governor's Mansion in downtown Raleigh, reflected the problem. Absentee ownership, redlining, real estate speculation, and nearly twice the city-wide rate of deteriorated and dilapidated housing units characterized the 100-acre neighborhood. At the start of the decade, the City of Raleigh had adopted a remedial planning strategy to combat these problems, which included increased residential density for the downtown, as well as construction of direct highway access through downtown. By 1975, however, both the north-south expressway and high-density residential zoning had been abandoned.

An alternative to the development strategy, presented in a planning staff report, recommended that Oakwood contain medium residential density with emphasis on preserving its historic aspects. The impetus for this recommendation came from the Division of Archives and History of the North Carolina Department of Cultural Resources, which nominated Oakwood for inclusion in the United States Department of Interior's National Register of Historic Places. The neighborhood was placed on the National Register in June, 1974. In the required statement of significance, the division's survey and planning unit observed:

> Oakwood, a twenty-block area representing the only intact nineteenth century neighborhood remaining in Raleigh, is composed predominantly of Victorian houses built between the Civil War and 1914. Its depressed economic state during most of the twentieth century preserved the neighborhood until 1971, when individuals began its revitalization. The great variety of Victorian architectural styles represented by the houses reflects the primarily middle-class tastes of the business and political leaders of Raleigh for whom they were built, as well as the skill of local architects and builders. Oakwood is a valuable physical document of Southern suburban life during the last quarter of the nineteenth century (A-S-P Associates v. Raleigh, 1979).

Proceeding under North Carolina's newly enacted historic district enabling law, the Raleigh City Council amended its zoning ordinance to create a 102-acre historic district which overlaid the Oakwood neighborhood, established the Raleigh Historic District Commission, and adopted architectural guidelines and design standards to be applied by the commission in its administration of the ordinance. The ordinance regulates building activity by requiring that all property owners who desire to erect, alter, restore, or move the exterior portion of any building, structure, or sign first obtain a certificate of appropriateness from the Historic District Commission. The Commission is authorized to prevent any such activity that is incongruous with the historic aspects of the district.

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The plaintiff, A-S-P Associates, is a law firm that owns a small vacant lot in the Oakwood Historic District. The lot, located at the edge of the district, is part of a relatively small area zoned for office and institutional uses. As part of the overlay historic district, Associates is allowed to erect an office building, but its design must be congruous with the Victorian architecture of Oakwood. A-S-P Associates brought a declaratory judgment action to invalidate the Oakwood ordinances, as applied to its property, on both statutory and constitutional grounds.

THE DUE PROCESS CHALLENGE

The first of these grounds was that the historic district ordinance violated due process. Due process, as applied to land use cases, requires that local regulations be related to the promotion of the public health, safety, and general welfare, and that the effects of such regulations be reasonable. The basic constitutional objection raised by Associates was that the historic district ordinance was outside the lawful scope of the police power. The Plaintiff contended that the ordinance focused entirely on the exterior appearance of structures in the district and, therefore, was based solely on aesthetic considerations without any real or substantial relation to the public health, safety, or general welfare. If accepted, this contention would prevent government regulation of private property for historic preservation in North Carolina. The North Carolina Supreme Court held that regulation of the exterior appearance of private property in the interest of historic preservation is a valid exercise of the police powers; in other words, historic preservation regulations promote the general welfare. Specifically, the Court found that historic preservation of the exterior appearance of buildings and structures promotes the accomplishment of a public good in a number of ways: it provides a visual, educational medium by which an understanding of our country's historic and cultural heritage may be imparted to present and future generations; it tends to foster architectural creativity by preserving physical examples of outstanding architectural techniques of the past; it can generate substantial tourism revenues; it can stimulate revitalization of deteriorating residential and commercial districts in urban areas, thus contributing to their economic and social stability (A-S-P Associates, 1979).

"THE DECISION REPRESENTS A MAJOR VICTORY FOR THE HISTORIC PRESERVATION MOVEMENT IN THE STATE..."

As part of its analysis, the Court recognized that the police power cannot be placed within fixed, definitive limits and that it may be extended to meet changing economic and social conditions. Further the Court cited with approval a federal court decision (Maher v. New Orleans, 1975) which held that "proper state purposes may encompass not only the goal of abating undesirable conditions but of fostering ends the community deems worthy.... Nor need the values advanced be solely economic or directed at health and safety in their narrowest senses. The police power inferred in the lawmaker is more generous, comprehending more subtle and ephemeral societal interests."

These pronouncements together with approval of historic preservation zoning may reflect a willingness by the North Carolina Supreme Court to allow localities to move away from traditional zoning (minimization of friction between land uses) and to allow local regulations which protect the environment, preserve the social character of the locality, and order urban development. Nonetheless, even with the A-S-P decision, North Carolina law is still not prepared to endorse reasonable regulations of property for aesthetic reasons alone.[1] This caveat is regrettable. Admittedly, historic preservation regulations are distinguishable from aesthetic regulations (Rathkopf, 1975: 15-4). However, the issue of aesthetic regulation was seriously contested by the plaintiff, and presently it is an important planning-law concern. The regulation of building design, landscape, and signs is commonplace, even in North Carolina. The silence of the opinion casts doubt about the validity of such regulations in North Carolina. The widespread enactment of aesthetic regulation, moreover, reveals that it is one of the primary devices local governments use to enhance the quality of life. Although approval of aesthetic regulation was unnecessary to the Court's holding, resolution of the issue would have eliminated the legal uncertainty about such regulation. It would have also strengthened the apparent willingness of the Court to accept more ephemeral societal interests as a basis for regulation.

A second important aspect of the A-S-P decision is its holding that requiring certificates of appropriateness for new construction is reasonable, even when applied to a vacant lot. No other appellate historic preservation case has approved the application of historic preservation to a vacant lot. Favorable resolution of this issue will enhance historic preservation efforts, since it is unavoidable that in historic districts some tracts of land will be vacant, and the potential for development and incongruous building activity is greater on vacant tracts than on already

developed lots. Preservation and protection of the setting or scene in which structures of architectural and historical significance are situated is just as important to historic preservation as preserving and protecting significant buildings. If concern is limited to historic buildings only, landmark and historic site laws alone would be sufficient to protect the historical legacy of the nation. Now, however, it is recognized that externalities have an impact and must likewise be regulated.

STANDARDS FOR HISTORIC DISTRICT REGULATION

A-S-P Associates also contended that the standards to guide the Historic District Commission were inadequate. This contention is bottomed on the rule which prohibits the delegation of legislative powers to administrative bodies. Accordingly, administrative bodies are not allowed to establish goals and policies (Jackson v. Board of Adjustment, 1969); their power is limited to determining facts which implement policies of the legislature. Fact-finding responsibilities must rest on definite, ascertainable standards; otherwise, the courts will invalidate the regulation (Coastal Highway v. Turnpike Authority, 1953). To show indefiniteness and unlawful delegation of legislative powers, Associates attacked the architectural guidelines incorporated into the Oakwood ordinance.[2]

Although municipalities have unlimited discretion to establish an historic district, the Court found that once a district is established, discretion is limited insofar as the method and the standard by which an historic district is regulated (A-S-P Associates v. Raleigh, 1979). Specifically, historic districts are administered by an historic district commission, the composition of which is specified by the General Assembly; the objects subject to regulation are delineated; and the procedural safeguards to offer expert evidence, cross-examine witnesses, and inspect documents help prevent administrative abuse (A-S-P Associates v. Raleigh, 1979). Furthermore, the high Court recognized that practical necessity requires that a substantial degree of discretionary authority be delegated to administrative bodies if historic preservation is to be achieved.

The analysis by the Court of the contextual standard of incongruity is particularly important to future preservation and planning cases. Both the state statute and Raleigh ordinance prevent building activity incongruous with the historic aspects of the district. As recognized by the Court, contextual standards derive their meaning from the total physical environment of the area, which must therefore be sufficiently distinctive to provide the required legal

Oakwood residences represent a variety of Victorian architectural style.

specificity. The standard of incongruity, when applied to Oakwood, is meaningful due to the Victorian architectural style which characterizes the area. Although other architectural styles are present in Oakwood, they do not render the standard of incongruity meaningless. These other styles are generally equally distinctive, and the architectural guidelines and design standards incorporated into the ordinance provide analysis of the structural elements of these different architectural styles.

Although total contextual uniformity is not required, planners and lawyers who advocate land use regulations based on a contextual standard must first be sure that the context in which the regulation is to operate is, in fact, distinctive and ascertainable. Contextual regulations applied to heterogeneous areas which make the standard unascertainable are invalid. Thus, the typical contextual standard that the requested special use be in harmony with the area is not, per se, invalid, but, if applied to an area with dissimilar architecture or land uses, such a standard could be invalidated as an unlawful delegation of power.

ISSUES IN HISTORIC DISTRICT LEGISLATION

Now that establishing historic districts, regulating new construction on vacant lots in these areas, and prohibiting incongruous building activity are firmly established in North Carolina, future preservation court cases will test specific applications of historic district regulations. Preservationists and their lawyers must alert themselves to the issues raised in such applications.

One issue which landowners may attack is the appropriateness of the historic district designation; not all areas of a city are of historical and architectural significance (remember, the Oakwood area is on the National Register of Historic Places). Furthermore, even if an area can fairly be termed historic owing, for instance, to its association with a famous person, the heterogeneous character of the area may not permit the exercise of the contextual standard of incongruity. In such a case, designation of historic sites may be the only way to achieve historic preservation.

Another issue which may lead to litigation is procedural safeguards. Now that the North Carolina Supreme Court has recognized that the presence or absence of procedural safeguards is relevant to the broader question of whether a delegation of authority is accompanied by adequate standards, it is essential that procedural standards be included in local ordinances and rigidly followed. At minimum, procedural due process requires:

1. the party whose rights are being determined to be given the opportunity to offer evidence, cross-examine adverse witnesses, inspect documents, and offer evidence in rebuttal;
2. absent stipulations or waiver, findings about crucial facts must not be based upon unsworn statements;
3. crucial findings of fact must be supported by competent material, and substantial evidence in view of the entire record submitted;
4. the historic district commission must state, with sufficient specificity, the basic facts on which it relied to allow or deny a certificate of appropriateness; and
5. essential elements of a fair trial be followed (Humble Oil v. Board of Aldermen, 1974).

Failure to follow any of these requirements will result in invalidating the actions of the historic district commission. Hence, a letter from an absent interested party may not be accepted as evidence, unless stipulated by the parties. Members of the historic district commission must disqualify themselves from particular cases if they have an interest in the outcome of the decision. If commission members have special knowledge of relevant facts, or have acquired such knowledge by personal inspection of the premises, the information must be revealed at the public hearing and made a part of the record. A notary public or other qualified person must administer the oath, unless stipulated otherwise.

Another potential issue for litigation is the appeal from a denial by the historic district commission of a certificate of appropriateness. In North Carolina, the only reason for denial of a certificate of appropriateness is that the proposed building activity is incongruous with the historic aspects of the district. The commission must enter in the record the historic aspects of the district and detail how the proposed building activity is incongruous with those aspects.

Yet another ground for legal challenge is the validity of the historic district boundaries. In the A-S-P case, the landowner alleged that the City of Raleigh acted arbitrarily and capriciously in setting the boundaries of the Oakwood Historic District. Associates' property is part of a one block area, zoned for office and institutional uses, which, in part, forms the southwest boundary of the Oakwood Historic District. Located on the block are four parcels: a nondescript, yellow brick-veneer building used for office space, Associates' vacant lot, the former Mansion Square Inn (built in the late nineteenth century), and a new office building of the State Medical Society. At the request of the Medical Society, its building and two lots used

"...HISTORIC PRESERVATION...PROMOTES THE ACCOMPLISHMENT OF A PUBLIC GOOD IN A NUMBER OF WAYS..."

for off-street parking were excluded from the Historic District overlay. Associates' request that its vacant lot be similarly excluded was denied; its property, as well as all other property on the block, was included in the Historic District. This, according to the plaintiff, violates the constitutional guarantee of equal protection and constitutes spot zoning. The Court of Appeals held that these facts constitute a *prima facie* showing of arbitrary and capricious spot zoning (A-S-P Associates v. Raleigh, 1979).

Spot zoning in North Carolina is "(a) zoning ordinance or amendment which singles out and reclassifies a relatively small tract owned by a single person and surrounded by a much larger area, uniformly zoned, so as to impose upon the small tract greater restrictions than those imposed upon the larger area; or so as to relieve the small tract from restrictions to

which the rest of the area is subjected; and in the absence of any clear showing of a reasonable basis for distinguishing among zoning parcels spot zoning is beyond the authority of a municipality" (Blades v. Raleigh, 1972).

The Supreme Court (A-S-P Associates v. Raleigh, 1979) applied a literal and mechanical solution to the boundary contention and held that the City of Raleigh did not engage in spot zoning for two reasons. First, the Oakwood Historic District overlay, 102 acres, restricted numerous property owners. Second, the non-inclusion of certain property owned by the Medical Society was not a reclassification in that it was not relieved from any pre-existing zoning restriction.

In spite of the favorable result, this aspect of the decision is potentially troublesome. Spot zoning principles are now an integral part of historic district case law in this state, even though considerations used to delineate historic districts are different from other zoning boundaries. For example, unlike the designation of other zoning boundaries, where consideration of property ownership is irrelevant, protection of structures associated with public figures is of course vital to historic preservation. Furthermore, because historic preservation regulations are based on contextual standards, local governments must be free to gerrymander the district in order to exclude incongruous buildings and uses.

The facts showed that the State Medical Society's building is a modern structure with virtually all of its architectural style incongruous with the historic aspects of the Oakwood Historic District; that the Society made substantial investments in the foundations of the building in order that two additional stories could be added at some future point; and that the adjacent lots owned by the Medical Society, which were also excluded from the district, were acquired to provide additional off-street parking necessary to future use of the building. Applying these facts to the standard test of equal protection, which requires that different treatment made by laws have a reasonable basis in relation to the purpose and subject matter of the legislation, the Supreme Court concluded that a reasonable basis existed for the exclusion of the Medical Society's property.

The State Medical Society Building was excluded from the Oakwood Historic District.

ZONING AND THE COMPREHENSIVE PLAN

The last major issue decided in the A-S-P case with particular relevancy to planners in North Carolina is the comprehensive plan requirement. Recently, courts, commentators, and legislators have redirected their attention to the general enabling requirement that zoning regulations be in accordance with a comprehensive plan. They have begun a close scrutiny of land-use regulations for their consistency with existing plans. For the remainder of this article, this recent trend will be called the "planning mandate theory."

The specific requirement of a comprehensive plan is intended to avoid an arbitrary, unreasonable, or capricious exercise of the zoning power (Speakman v. Mayor & Council, 1951). Fidelity to a comprehensive plan, it is believed, will ensure that long-term policy goals are given more emphasis in local zoning matters than the pressure of individuals for special treatment (Harr, 1955). It is also believed that fidelity will provide the courts a standard for review of land use matters which is more sharply defined than the standard due process test of reasonableness (Harr, 1955). Still another reason advanced for strict adherence to conformance is the belief that only through comprehensive decisions, in contrast to *ad hoc* determinations, is it possible to achieve efficient allocation of land uses. Thus, Harr (1955) has argued that land use regulations enacted without reference to a formal plan are, per se, unreasonable because they fail to consider the complex relationship between various land use controls and the general welfare.

North Carolina, like most other states, does not require zoning decisions to be based on extrinsic plans. Prior to the A-S-P case the decisional law in this state merely required that zoning regulations be geographically comprehensive and that such regulations be reasonably calculated to achieve the aims of the enabling law (Allred v. Raleigh, 1970). The Court, in A-S-P, reaffirmed this position despite the recent application of the planning mandate theory in other states. Even so, A-S-P is not an "anti-planning" case.

Oakwood homes document 19th century suburban life in the South.

The Court indicated that evidence showed that Raleigh had engaged in comprehensive studies of the city's transportation, public facilities, parks and recreation facilities, and housing stock. The evidence, moreover, showed that the adoption of the Oakwood Historic District Ordinance was based on a planning study which gave careful consideration to the various ways Raleigh was attempting to protect and promote the general welfare. The case can, in fact, be linked to the "planning factor doctrine," which advocates that the courts examine local land use decisions in light of adopted planning studies, but does not require the adoption of plans (Sullivan and Kressel, 1975). The Court's rejection of the planning mandate theory is justified at this time because of the numerous problems associated with the theory.

The most basic of these problems is definitional. What is a comprehensive plan, and what is meant by consistency? The illusive concept of comprehensive planning has been, and is, the subject of great debate. The Raleigh planning director (A-S-P Associates v. Raleigh, 1979) believes that a comprehensive plan is a rational process with no particular end-state. The Plaintiff, relying on the New York case of Udell v. Hass (1968), contends that a comprehensive plan is revealed through judicial review of "all relevant evidence as garnered from any available source."

California planning law mandates that the comprehensive plan contain specific elements, such as housing and open spaces, while other states, such as Oregon, require adoption of state-wide planning goals to which local plans and regulations must conform. Although North Carolina has no specific comprehensive plan legislation, it appears that the approach of this state is evolving towards the Oregon approach.[3] However defined, the plan must be specific and internally consistent or it will amount to little more than a series of agreeable cliches that are of little assistance in directing municipal regulatory efforts. Therefore, under the planning mandate theory, not only must the courts mandate planning, they must actively supervise plan content to ensure specificity and internal consistency.

The term *consistency* involves at least three levels of analysis: internal consistency, consistency between local plans and state and federal goals, and consistency between local plans and local regulations. Although easy to explain, the concept of consistency is almost impossible to apply. Minor locational differences between mapped plans and the actual zonings have been both tolerated and disallowed by the courts.[4] The state of confusion is perhaps best illustrated in California. In that

"THE CONSISTENCY REQUIREMENT...IS INTENDED TO PROVIDE THE COURTS WITH A STANDARD OF JUDICIAL REVIEW MORE SHARPLY DEFINED THAN THE STANDARD DUE PROCESS TEST."

state a statute requires that the various land uses authorized by ordinances be compatible with the objectives, policies, general land uses, and programs specified in local plans. George H. Murphy, California Legislative Counsel, commenting on whether this statute allows land regulations which are less intense than proposed in the plan stated that "a zoning ordinance which permits either a greater or less intense land use than that permitted by the general plan would not be in agreement with or harmonious with the general plan, and in our opinion would not be consistent with the general plan" (Sullivan and Kressel, 1975:52). The opinion of Murphy, however, is directly contradicted by the California Attorney General.[5]

The courts are similarly divided on this simple question.[6] As of 1978, there were at least twelve California appellate court decisions which have involved the consistency requirement. Even the advisory guidelines to assist local governments (drafted by the California Council of Intergovernmental Relations) have not, according to Mandelker (1976), a leading supporter of the planning

mandate theory, done any more to clarify the consistency requirement than adopt a rule of reason which is strikingly similar to the position of prior court decisions. Similar difficulties exist in almost all planning mandate states; recent Florida and New Jersey planning statutes do not even define the term consistency, and court decisions sometimes even ignore the requirement. Ironically, the consistency requirement, according to its supporters, is intended to provide the courts a standard of judicial review more sharply defined than the standard due process test.

Practical problems aside, it must be asked if inconsistency is necessarily bad. Justice Brock, writing for the North Carolina Supreme Court in the A-S-P case, observed: "A rational process of planning for a large city's varied needs inherently involves conflicts, changes, and inconsistent proposals as to how they should be met." Excessive reliance on the consistency requirement might even chill the preparation of innovative plans by local governments and thus inadvertently place a premium on planning which supports existing policies. Unless the courts involve themselves in reviewing the substance of plans, there is the further danger that outdated plans or plans based on erroneous assumptions about future change will be imposed on local governments.

Policy flexibility is needed to prevent a community from being locked into an undesirable earlier decision; this was particularly true in regard to the Oakwood neighborhood for which Raleigh changed its policy from a development strategy to a preservation strategy. From a legal point of view, the community is always capable of using its police power to adapt to changing conditions or merely to implement a different set of values. As the Pennsylvania Supreme Court (Chenney v. Village, 1968) explains, "It is a matter of common sense and reality that a comprehensive plan is not like the law of the Medes and the Persians; it must be subject to reasonable change from time to time as conditions...change." Therefore, amendments to any adopted plan must be allowed, and court decisions have so recognized this right. If, however, local governments have the right to amend their plans without strict controls, the possibility of *ad hoc* decisions based on favoritism is just as great under the planning mandate theory as under the present rule.

"IF CONCERN IS LIMITED TO HISTORIC BUILDINGS ONLY, LANDMARK AND HISTORIC SITE LAWS ALONE WOULD BE SUFFICIENT..."

Zoning is one of the many regulatory devices used to implement community plans. Eminent domain, housing assistance programs, and capital improvements are but a few of the many non-regulatory devices local governments can use to implement their plans. There is a real danger that, in reviewing zoning cases for conformity with local plans, the courts will lose sight of this and, through ther decisions, zoning will become the sole regulating device. Because of the stricter requirements for conformance, the courts may abandon their earlier decisions that comprehensive plans are advisory documents and therefore do not give rise to due process "taking" claims. Thus, if a community plan designates an area for park and recreation use and the law in that jurisdiction requires strict adherence to the plan, it seems manifestly unfair for the landowner to remain uncompensated for the reduction in property values until the community is able to acquire the property.

Even from a philosophic standpoint, strict reliance on the planning mandate theory may be suspect. The theory clearly elevates the rational planning model to legal predominance. All other models of planning, such as incremental or process planning, are excluded by the conformance requirement. Proponents of the planning mandate theory necessarily believe that governmental planning and allocation of land uses are the most efficient means of allocating resources. It is debatable whether this belief is in fact true. Certainly, con-

The N.C. Supreme Court held that historic preservation promotes general welfare.

sistency review is not an efficient use of judicial resources. If, as contended by supporters of the planning mandate theory, the proper role of the judiciary is to review land use regulations for consistency, who reviews the goals of those plans? Presently, the greatest utility of plans is the support and justification of harsh land regulations which are adverse to regional housing interests. Attention to the minutiae of consistency may distract judicial review away from the consequences of plans. It seems that an administrative board with expertise in planning is a more appropriate forum to understand and evaluate consistency than the courts. Of course, this solution requires new legislation. In fact, the wide range of problems associated with the planning mandate theory are best resolved by the legislature. Even supporters of the planning mandate theory have advocated legislative intervention. Therefore, failure to embrace the planning mandate theory in A-S-P is not necessarily rejection of the theory.

"ATTENTION TO THE MINUTIAE OF CONSISTENCY MAY DISTRACT JUDICIAL REVIEW AWAY FROM THE CONSEQUENCES OF PLANS."

Finally, proponents of the planning mandate theory have failed to sufficiently explain why means other than the comprehensive plan cannot be found to reduce arbitrary local land use decisions. Equal protection, with its requirement that properties which are similarly situated and located be treated alike, can be used to ensure fairness. Requiring a statement of reasons articulating the basis for rezoning decisions affords another safeguard against arbitrary and careless action, and such statements are likely to result in greater consistency in decision-making.

CONCLUSION

Clearly, except for the mechanical approach to spot zoning and reluctance to permit aesthetic regulation, A-S-P v. Raleigh is a very positive planning-law case. It permits local governments to preserve the historic legacy of the state, even to the extent of regulating vacant lots in historic districts. It recognizes the validity of contextual standards and establishes procedural and substantive guidelines on how these standards may be used, and the court steers a proper middle course with respect to the role of land use plans in court decisions.

NOTES

1. Even though in 1972 the North Carolina Supreme Court in *State v. Vestal*, 281 N.C. 517, 189 S.E. 2d 152 (1972), took note of the growing body of authority in other jurisdictions that recognized that police power may be broad enough to include regulation of property for aesthetic reasons alone; the rule in North Carolina, as well as most other states, is that such regulation is an impermissible exercise of the police power.

2. The guidelines vary in specificity. For example, the guidelines contain general standards, such as the prohibition of building activity that is "flagrantly out of character;" but they also contain specific standards, such as those prohibiting plateglass windows and flat roofs. The guidelines are divided into three major divisions: those which apply to proposed changes to existing structures, those which apply to new construction, and those which apply to landscaping. For new construction, the guidelines set forth limitations on spacing, lot coverage, and height which are all related to the same characteristics of existing structures in proximity to a proposed new structure.

Oakwood was placed on the National Register of Historic Places in 1974.

Concrete and steel contemporary building owned by the N.C. Medical Society.

3. Prior to the recodification in 1972, sec. 160-174 N.C. Gen. Stat. required that zoning regulations be in accordance with a comprehensive plan and be designed to facilitate the adequate provision of transportation, water, sewerage, schools, parks, and other public requirements. Since 1972, the specific purposes have been deleted from 160A-383 N.C. Gen. Stat. In 1976, the North Carolina Land Policy Council proposed that amendments to local land use plans be submitted for review to the regional planning body in order to be tested for consistency with the guidelines of the regional and state plans. Land Policy Council, A Land Resources Program for North Carolina 4-15 (1976). The North Carolina Coastal Area Management Act requires that a regional commission prepare guidelines (N.C. Gen. Stat. sec. 113A-107(a)) and that county and municipal plans prepare land use plans (N.C. Gen. Stat. 113A-110). In areas of environmental concern, local land use plans must be consistent with the promulgated guidelines (N.C. Gen Stat. secs. 113A-107(a) and 110(a)).

4. Compare *Duddles v. City Council of West Linn*, 21 Or. 310, 535 P. 2d. 583 (1975), with *Ward v. Knippenberg*, 416 S.W. 2d 746 (1967).

5. 58 Ops. Cal Atty Gen 21, (1975).

6. Compare *Marracci v. City of Scappose*, 26 Or. App. 131, 552 P. 2d. 552 (1976), with *Louisville v. Kavanaugh*, 495 S.W. 2d. 502 (1973).

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Donna Dyer

The Community Land Trust as an Alternative Land Tenure System

Growing citizen concern over the conversion of farm land to more intensive uses, and about the disappearance of family farms, has captured the attention of numerous federal officials. Eleven federal agencies are currently pursuing a national agricultural lands study, constituting a review and synthesis of all existing studies of the changes in prime agricultural land in this country. Secretary of Agriculture Robert Bergland has called for a national dialogue on the structure of American agriculture. In ten public meetings, in 1979, he listened to testimony of citizens regarding land ownership, control, and tenancy; barriers to entering and leaving farming; size of farms; the role of technology; returns to farmers; costs to consumers, and many other critical issues concerning the nature of rural life in the United States. A report and recommendations are forthcoming. These small steps reveal concern at a level that may slow the unchecked concentration of land ownership depicted below, or at least may support and encourage alternative tenure systems such as the community land trust.

The current land reform movement in the U.S. seeks not only to change and control land *use*, but further to change and control *ownership* patterns. The economics of land ownership determines in part its use--whether the land is farmed or developed--and determines to a large extent who is wealthy and who is poor. Current patterns of land ownership in the U.S. have not been thoroughly studied, and those reports which have been produced are investigative searches dependent on tax rolls and annual reports with no support from the government sector (Barnes, 1971). These preliminary investigations have revealed staggering statistics: it is likely that five percent of the population owns nearly two-thirds of the private property in America (Barnes, 1972). This report, seven years old, does not reflect the growing trend of foreign direct purchase of American land, removing the land from the people at a quickening rate.

One suggested reform is the establishment of community land trusts, removing parcels of land from the free market and placing them on a stewardship for a larger common good. What follows is a look at the development of the concept of private ownership in the U.S., the current situation, and the feasibility of communal ownership as a successful reform.

DEVELOPMENT OF PRIVATE PROPERTY

The extension of a person's right to land beyond simply the right to use it derives from imperial Rome (Sakolski, 1957). Traditional notions of land ownership are quite different from the American acceptance of individuals (or corporations) accumulating more land than they can use and then charging others for the privilege of using it. African, ancient Chinese, and American Indian cultures considered the village or community the holder of land, distributing it only as it was needed for use (Bertrand and Corty, 1962).

With the emergence of the Roman Republic, each citizen was granted a small parcel of land as well as rights to the public domain. Wealthy families began to amass the public land, and military leaders were granted large tracts of this land both in Rome and in conquered areas throughout Europe. Eventually, small landowners could not compete with the landed aristocrats and sold their land, creating even wider social and economic disparities (Sakolski, 1957).

British feudal empires, although characterized by large privately-held estates, left some public land for commoners to farm or graze livestock. In the 17th and 18th centuries, however, the Enclosure Acts allowed the landed class to fence off millions of acres of common land from public use (Bertrand and Corty, 1962). The commoners who left England as a result of this feudal land grab settled in New England, and, initially, land there was evenly distributed, with common areas as well. The land companies who settled the South, however, were sent by the aristocratic class, who parceled out large plantations and began to farm them using African slave labor (Barnes, 1972).

Once the U.S. gained its independence, some method for distributing the unsettled expanse of Western lands had to be determined. The debate was not concerned with whether private or public ownership would be explored; there

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was no doubt that individuals would be allowed to own the land. One side of the debate, most identified with Jeffersonian ideals, favored distribution of small parcels to settlers at no cost. The opposition favored selling the land to settlers and speculators alike (Sakolski, 1957). Unfortunately, the wealthiest speculators were among the most powerful politicians, and what ensued was the distribution of millions of acres with no regard for the individual.

The series of land frauds that took place in the first half of the 19th century succeeded in driving up land prices to the point that people moving West could not afford to settle, and set the stage for today's distribution of land. The earliest of these frauds, known as the Yazoo land frauds, allowed the Georgia legislature to give away more than 30 million acres to a group of land speculators (Patrick Henry included) who then resold them at enormous profit (Bertrand and Corty, 1962). Henry Miller, a German immigrant who amassed 14 million acres in his lifetime, succeeded in acquiring free from the government several thousand acres of dry land under the Swamp Lands Act of 1850. The Act made available to individuals free any "swamp land" only traversable by boat, so Miller crossed his land by loading a rowboat onto a wagon and having a team of horses pull him across.

The timeliness of these frauds is realized in the case of Lloyd Tevis and James Ben Ali Haggin, who received title to 150 square miles of California's San Joaquin Valley by hiring vagabonds to claim 640-acre parcels of land under the Desert Land Act and then transferring those claims to themselves. Although the fraud was discovered, the lands were never returned, and in 1890 Haggin and Tevis incorporated the land under the name of Kern County Land Company. In 1936, oil was discovered under the land, and rather than pay taxes on the oil earnings, Kern County Land Company invested in tax-loss farming. In 1967, Tenneco, an oil-chemical-manufacturing-packaging-farming-land development comglomerate bought the company, and although Tenneco reported earnings of $73.8 million in 1970, it paid no federal income taxes that year, and filed a tax credit of $20 million (Barnes, 1972).

While these land frauds were amassing land with no regard for the law, Congress enacted laws throughout the 1800s which allowed the acquisition and perpetuation of large land holdings. The initial land act was the Pre-emption Act of 1841, which allowed families already settled on 160 acres of unsurveyed land the first option to buy it. This Act, as well as the more important Homestead Act of 1862, allowed land speculators to obtain thousands of acres of land by using "dummy entrymen"--hiring men to claim land and sign it over to the company. The Homestead Act, on paper, granted families 160 acres if they lived on the land and improved it for five years. In reality, few families received the benefit of this law.

Realizing the rampant violations of the Homestead Act must be stopped, Congress enacted the Reclamation Act in 1902. This law provided federal funds for irrigation of farmland only if the owner resides on the land and owns less than 160 acres. The low density of settlement patterns made its enforcement difficult initially, and enforcement of the 160-acre limit continues to plague the Bureau of Reclamation, as political pressure forced relaxation of the regulations (Barnes, 1972). In California, farmers' organizations are still working to have this Act enforced and implemented for small landholders (Markusen, 1979).

"...IT IS LIKELY THAT FIVE PERCENT OF THE POPULATION OWNS NEARLY TWO-THIRDS OF THE PRIVATE PROPERTY IN AMERICA..."

The social consequences of these historical giveaways are the perpetuation of the current pattern of land ownership, creating great disparities of wealth and power between the landed aristocracy and the small landowner. Eventually the landless (powerless) rural people migrate to the cities, unprepared for urban life, or remain in poverty in their homelands. This early land distribution farce set the stage for the current corporate comglomerate landownership in the U.S.

THE TREND CONTINUES

Blatant violations of laws are easily identified, even if they are not easily rectified. Today, political land giveaways to favored landowners are much more subtle, achieved through preferential tax treatment, zoning changes, highway routing, and subsidies.

The tax system provides incentives for land speculation in four ways. First, and probably the most lucrative tax benefit, is the capital gains tax. Under this loophole, profits from the sale of real estate are taxed at approximately half the regular income tax rate. A second tax break is the accelerated depreciation clause. Real estate investors are allowed to deduct from their taxable income the annual depreciation of structures on their land (Barnes, 1972). Most real estate investments do not depreciate at all, so investors get a double return on their investment at the expense of the taxpayer.

The oil depletion allowance, a tax break for owners of oil, timber, coal, and other mineral deposits, deprives the federal treasury of up to $1 billion a year (Barnes, 1972). Later it will be shown that a large percentage of these lands are owned by a very few large companies.

The fourth tax break for land speculators is the deduction of farm losses from non-farm income. Again, as in the accelerated depletion clause, although the land *use* is losing money, the land *value* is increasing rapidly, and any losses are returned in part through income tax deductions (Barnes, 1972).

In addition to income tax provisions, property taxes are also lower for large landholders, through the systematic underassessment of corporate landholdings. In 1970, a Vanderbilt University study reported that, in Tennessee's five most productive coal counties,

"...CONGRESS ENACTED LAWS THROUGHOUT THE 1800S WHICH ALLOWED THE ACQUISITION AND PERPETUATION OF LARGE LAND HOLDINGS"

coal companies control one-third of the land but pay less than 4% of the property taxes. In Georgia, in 1972, the state government paid $2000 an acre for land owned by Union Camp that had been assessed at $20 an acre (Barnes, 1972). The list of extralegal underassessments is endless.

Some tax policies have legalized underassessment. In 1966, the California legislature enacted the Williamson Act, a law to preserve prime agricultural land by reducing property taxes on the land, the idea being that lower taxes would keep the farmer from having to sell out to developers. A 1972 study by the California State Board of Equalization revealed that 26% of the 9.5 million acres benefitting from the Williamson Act are owned by twelve corporations (Barnes, 1972).

The social welfare implication of underassessment is that the wealth of rural areas is being *siphoned* away by absentee-owner corporations. The corporations are not reinvesting their profits in the region, largely because the company's base is usually not where their farmlands are, and they are not even paying enough property taxes to support public facilities (primarily schools) (Barnes, 1972). Corporations generally use migrant farm labor, who do not pay taxes or spend their money in the region either.

Another area of government policy which, although intended for the small farmer, actually benefits the corporate landholder is the subsidy program for not growing crops. Originally, the subsidies were to prevent the small farmer from being forced off the land by rising costs and lower prices. Yet this program, too, has backfired. The wealthiest seven percent of farms receive 40% of the benefits of the subsidy (Casalino and Barnes, 1972). When Congress set a $55,000 limit in subsidy, many corporations subdivided into dummy subsidiaries to receive full benefit (Barnes, 1972).

THE CURRENT DISTRIBUTION OF LAND

The combination of government support for corporate ownership of rural land and the corporations' ability to manage around the law has created the conglomerated land holding situation today. Activities requiring large tracts of land for success have been industrialized by large U.S. and multinational corporations. Agriculture, timber, energy, and land development profits are all concentrated in the hands of a few large landowners.

TIMBER

Non-local timber companies are the largest landowners and largest industrial employers (lumber, pulp, and paper), as well as the largest polluters in the South.[1] Often the single company in a rural town, they enjoy low wages, low taxes, and no unions. Other timber dependent states are under the control of the same corporations; in Maine over one-half of the state's land area is controlled by five large timber companies and their subsidiaries. The top twelve corporations control over half the total timber industry acreage in the U.S. In addition to their corporate holdings, the "multiple use" criterion of national forests have set aside 186 million acres of public forestlands for use by the timber companies, although in theory recreation, wildlife, and watershed protection are equally considered.

The large get larger in the timber industry --Georgia-Pacific acquired sixteen smaller companies from 1960-1970--and the government encouraged this growth in each company through the capital gains tax. Additionally, with the increasing technological shift of the timber production industry, to tree farming (planting trees like crops) and mechanized harvesting, individuals will soon be unable to compete in the timber market.

ENERGY

Although the exact holdings of oil companies cannot be determined, domestic oil holdings of the largest companies total over 64 million acres. Beyond oil, the largest twenty oil companies own 60% of U. S. natural gas reserves.

Over thirty of the top fifty coal companies are oil subsidiaries, and oil companies control over half the available uranium reserves. These corporations are beginning to buy failing solar companies as well, in an attempt to gain complete control of all energy supplies, termed "vertical integration."

The grim reality of energy production can be seen in Appalachia, where fossil fuel mining is a billion dollar endeavor annually. Yet the residents of Appalachia remain poor and totally controlled by the mines, which jeopardize their land, their homes and their health.

LAND DEVELOPING

Many of the major corporations are putting their land holdings to use in residential development. "The solution to the problems of a city," according to the president of the ITT Community Development Corporation (Barnes, 1972), "is to have someone enlightened own it and control it." Large corporations, feeling enlightened, are attempting to develop (and control) their own cities. ITT is developing the city of Palm Coast on 100,000 acres of Florida's shore; Standard Oil is involved in four communities developing near Houston; Gulf Oil has begun developing new towns in five states.

Land development is a good investment to avoid inflation, taxes, and the development of stockpiles of old money, and also reaps great profits. Even under the guise of developing well-planned, pleasant living situations, the corporations have created sterile uniform suburban development (like Levittown and Reston) that allows them to maintain control over their expanses of undeveloped land as well. More subtly and even less tested is how deliberately the corporate developers are creating uniform living environments, encouraging the American public's dependence on the products of the corporations, and increasing their control over the American lifestyle.

AGRICULTURE

In 1950, there were 5.4 million farms in the U.S., the average size being 215 acres. That situation changed in the next decade to 4.6 million farms, averaging 302 acres (Bertrand and Corty, 1962). By 1970, there were only 2.9 million farms, the average being 380 acres. An article in the *Wall Street Journal* on May 11, 1972 estimated that 1670 small family farms were being sold *per week*. The largest 2% of farms (approximately 40,000) accounted for over one-third of farm sales in 1969 (International Independence Institute, 1972).

Conglomerates such as Standard Oil, Boeing, Dow Chemical, Goodyear, Union Carbide, and Tenneco are all investing in agribusiness, with the blessings of the U.S. Department of Agriculture. The USDA claims larger corporate farms enjoy more economic efficiency in food production. Yet in 1967, J. Patrick Madden, a USDA economist, reviewed 138 studies of farm production costs and found that mechanized one- and two-person farms, in all studies under 1000 acres, were repeatedly more efficient (Barnes, 1975). Efficiency aside, corporate farms can afford to lose money on farming and often desire a loss for tax purposes discussed above. A small farmer, living off his or her farm income, seems on paper to have a less economical operation than the large corporation's farming efforts. A small farmer simply cannot compete.

Aside from the tax incentives for corporations to invest in farmland, speculation is a profitable reason for buying agriculture land. *Dun's Review* put it aptly: "The kicker in many agri-deals is the hope that a suburb or a recreation development will sprawl its way." (Casalino and Barnes, 1972).

Some of the corporate farmers have a real interest in farm production, hoping to develop integrated "total food systems." Tenneco, originally an energy company and among the top fifty corporations in the U.S., is attempting

"...THE KICKER IN MANY AGRI-DEALS IS THE HOPE THAT A SUBURB OR A RECREATION DEVELOPMENT WILL SPRAWL ITS WAY."

to control a selection of fruits and vegetables "from seedling to supermarket." The company purchased the Kern County Land Company in 1971 (1.8 million acres) and Heggblade-Marguleas, the largest fresh produce distributor in the U.S. Combine these purchases with Tenneco's Packaging Corporation of America, farm machinery corporation (J.I. Case Company), oil and chemical subsidiaries, and the largest date processing plant in the country, and they have essentially cornered the market (Barnes, 1972).

The implications of this change in the pattern of farm holdings in simple economic terms are explicit: to start a farm that costs $500 in 1940 now has capital costs of $12,000, not including interest payments and assuming an individual can secure a loan of that magnitude. One of the major contributors to this exponential jump in farm start-up costs is the increasing technological dependency of agricultural production. Agriculture technology is not only capital intensive (machines, buildings, and chemicals), but is also concerned with the hybridization of plants and animals and new techniques such as crop rotation and contouring which are labor-intensive. The shift

toward increasing use of technology also implies a theoretical increase in the amount of land available to a farmer as productivity per acre increases. This increase in productivity per acre as a result of increasing technology nets a decrease in the actual number of people employed on farms.

As agriculture becomes more mechanized and continues to be dominated by the corporations with the capital, the family farmer is effectively driven off his or her land. Many have migrated to urban areas. Some continue to subsist in poverty on land that has been in their family for decades. A few farmers are proletarianized by large corporate farms, continuing to farm but having no stake in the land (International Independence Institute, 1972). A growing number of small farmers are supplementing their incomes with off-farm jobs. Using the 1960 statistics again, 34% of employed men and 61% of employed women living on farms were engaged in nonagricultural jobs. These percentages are an increase from 17% of men and 52% of women in 1940 (Bertrand and Corty, 1962). The option for men and women to gain independence from the current industrialized American lifestyle is rapidly becoming an economic impossibility.

Unfortunately, my limited research has found no sociological studies of the problems of farm residents who are forced to live in bleakest poverty as a result of corporate hoarding of land, forced to sell the land their family has farmed for generations, or forced to move or work in the city. Most social science researchers are preoccupied with the urban environment, where large numbers of unhappy people at high densities create health, safety, and satisfaction problems for the ruling class. The urban rich cannot avoid being affected by the urban poor as easily as they can forget the plight of the small farmer, isolated many miles away. This preoccupation with the city on the part of both researchers and government agencies has allowed the unchecked amassing of much of the remaining rural land in the U.S., as small farmers then are integrated into the urban problem.

AN ALTERNATIVE

The problems of urban crowding and corporate control of the U.S. economy are easily recognized and often debated, yet few analyses question the American system of private land tenure. Modification of the system which allows a few wealthy individuals and corporations to collect land in absentee ownership is the first step toward a more equitable distribution of wealth. The community land trust is an institutional, legal, alternative form of land tenure that may provide a means to achieve this new distribution.

The community land trust concept is an attempt to separate land from those things classified as property and to consider it as trusterty. According to Ralph Borsodi, a founder of the land trust movement, property is created by people through their labor, and can be owned and exchanged. Trusterty is land, water resources, natural forests, and mineral resources--essentially that which was not created by people and should not be owned by individuals (Borsodi, 1968). Robert Swann, director of the Institute for Community Economics and the National Community Land Trust Center, proposes that any trusterty which is held at all should be held as a common trust, under the control of the entire community (International Independence Institute, 1972).

Within this theoretical framework, the actual land trust is a legal entity, generally a private nonprofit corporation, that acquires land by gift or purchase to be held for an unlimited duration. Proponents of land trust do not consider government intervention to nationalize land the most feasible nor the most effective method of acquiring land. In the 1930s, the Federal Resettlement Administration tried land trusts, which were unsuccessful for basically two reasons. First, land trusts were initiated and administered by the FRA rather than as a response to public demand. Second, the politics of government control of land placed too much pressure on the FRA, so the program never got off the ground (International Independence Institute, 1972).

Once the land is acquired, the trustees determine what parts of the land trust are of interest to the community as a whole, such as mineral resources or water. The remainder of the land is divided and leased to members of the trust. The individuals or families involved generally sign a long-term renewable lease, and pay annually approximately 2-3% of the cost of the land. In some instances the leases are inheritable and guarantee the same rights and security a landowner typically enjoys. The exceptions are that the lessee must be in residence on the land and that the lessee cannot exchange the land or the lease on the open market, but must deal with the other trustees.

The trust is administered by members of the community, and a variety of forms of governing are presently used. Income from the leases can be used to purchase more land or to help other groups begin their own trusts. The community also decides generally the acceptable uses of the land.

USE OF LAND TRUSTS: URBAN APPLICATIONS

How the land is used makes community land trusts different from conservation trusts such

as the Nature Conservancy, whose land trusts are specifically to preserve special areas. Community land trusts encourage development that seeks to meet both the economic and social needs of a larger community. Generally, community land trusts are developed as either solely residential communities or residential/agricultural communities; these forms will be discussed in greater depth below. There is, however, potential for urban land trusts as well. The National Urban Land Program of the Trust for Public Land focuses on inner-city vacant lots (an estimated 20,000 in Philadelphia, 45,000 in New York, and 100,000 in Los Angeles), acquiring these bits of land and bringing them under community control. The interested residents form a committee, and eventually an autonomous corporation to take the land titles. Projects to date have been developed as community gardens and parks or cleared and planted as open space with future plans for use (Blackmore, 1978).

In Rockville, Maryland and St. George, Vermont, the municipalities have assumed title to land which normally would be sold for taxes. In Rockville, forty acres of industrial development is planned, the land being leased rather than sold to developers. The city then has more direct control over the use of the land than zoning could provide (International Independence Institute, 1972). Local governments, then, could act as a trustee when land is newly developed, retaining title to the land and monitoring its development. Edgardo Contini (1972) suggested the concept of "land dedicated to urban development as a public utility, owned and administered by the community itself." Community control through the local governing body would be acceptable governmental intervention to the proponents provided the trust is administered by an independent public body. Unless governments can be involved, widespread use of community land trusts, particularly in urban areas, may never materialize.

USE OF LAND TRUSTS: RURAL APPLICATIONS

Rural agricultural land trusts are much less complicated and more politically and economically feasible than urban ones. Generally, rural trusts can be accomplished with less government involvement, and at a lower cost than urban land. And at the present, while rural land trusts can provide a residence and a livelihood for members, urban land trusts are smaller parcels which can only be used collectively, making the rural areas an easier choice for members, based on personal economics.

Rural land trusts occur at every scale, from thirty acres to the 5700-acre New Communities, Inc., in Lee County, Georgia. Most of these trusts, initiated by Robert Swann's Institute for Community Economics, are based on the *Gramdan* movement in India, which set aside millions of acres for the landless poor while Gandhi was in power. The basis for New Communities, Inc., was to begin to provide a land base for Georgia's rural black population. The articles of incorporation of the North Carolina Land Trustees of America, Inc., include as a purpose to acquire land "to be used by people who possess the abilities and will to act as stewards of the land but who lack capital resources."

THE SUCCESS OF THE MODEL

New Communities, Inc., is the most publicized community land trust, the first one organized around the *Gramdan* model. Begun ten years ago, the farm is the largest black-owned single-tract agriculture operation in the U.S. Future plans include building residential settlements, schools, and an industry base (centering on the processing of farm products) (Blackmore, 1978). They have the potential for a self-sufficient new town, yet no private property in the entire development.

Vermont's Earth Bridge Land Trust, Virginia's Wartroot Trust, and the Oregon Women's Land Trust are based on collective agriculture efforts. Maine's Sam Ely Community Services Corporation has concentrated on leasing land to individuals for their own individual efforts, whether farming or simple residential, still preserving some common land (Blackmore, 1978). In all cases, families who would otherwise be forced to live in non-rural settings near industrial jobs and where low-cost housing is more abundant now have access to land they can develop in accordance with the community's wishes and their own desires, and now may gain a measure of control over their own lives.

An added benefit of community land trusts is the variety of people attracted to them. An unscientific survey of members of land trust communities by John Blackmore (1978) revealed a multiracial mix of all ages, all economic levels, and all political ideologies. Common to most are love of the land, desire to have more control over how land is used, and recognition that the government will not intervene in the growing control of productive land by large corporations. Few could have chosen this lifestyle without the community land trust.

CONCLUSION

Although only a small amount of land is currently held in trust, the existing community land trusts show the viability of such a tenure

system. Not everyone in the U.S. can live on a farm nor would they choose to, but the current maldistribution of the population (according to the 1970 census, 70% of the population lives on 2% of the land area) and the success of land trust experiments suggest that more people would choose a rural lifestyle if resources were available to do so. If corporate landholdings are allowed to increase at their current rate, fewer and fewer individuals will be able to live in non-urban environments.

The perpetuation of private ownership also contributes to the powerlessness of working people whatever the environment. Marx suggests the industrial proletariat could never have been created had land been available to everyone. In agricultural production, increasing disparity in holdings by one owner coupled with increasing disparity in technology and scale of production, has led to the proletarianization of the family farmer. Land trusts are providing a means for these farmers and others to regain their independence.

For land trusts to be successful on a nationwide basis would require large-scale changes in the American political and economic systems. The existing efforts, however, are providing the disenfranchised and others access to land and to a productive capacity that can compete with corporate farming systems. They may prevent the corporations from achieving "vertical integration" of all food products; that is, stop the control of every aspect of production from "seedling to supermarket."

Economically, land trusts can influence land prices in the adjacent region by either leasing land on favorable terms (placing a ceiling on prices) or holding back from the market (putting a floor under prices). The rental charges on leased land can also influence demographic patterns, if the trusts can accommodate a significant proportion of the population.

On a broader social level, land trusts and the sharing of land encourages residents to use a cooperative economic organization in their other endeavors, familiarizing the market-indoctrinated Americans with other economic systems. And without the motive of profit, development decisions can be more influenced by larger community objectives and definitions of need not based solely on economic gain.

The accepted planning solutions to urban problems today focus on inner-city situations--public housing projects, industrial jobs. To a limited extent, through mechanisms such as the community land trust, rural solutions may be sought to urban problems. Making viable a rural lifestyle may in fact circumvent some problems which arise as rural residents are forced into the city. Consideration of the 98% of the land area where densities are lower may result in fewer urban problems directly, as city-dwellers become able to take on a non-urban lifestyle, and indirectly, as land trusts slow the corporate takeover of rural land in the U.S.

NOTES

1. The discussions of timber, energy, and land developments draw totally on the research of Peter Barnes and Larry Casalino, 1972, *Who Owns the Land?*, published by the Center for Rural Studies, San Francisco, California.

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Peter Lund

LRIS and MLMIS: A Comparison of Two State Land Information Services

Over the past twenty years, we have witnessed the emergence of a multitude of information systems, both in the public and private sectors. These systems have provided a more effective means, in terms of cost and time, to process large amounts of raw data. Their use has, in many instances, allowed for unrestricted data communication, eliminated redundancy, facilitated updating procedures, provided a method for data standardization and classification, and improved data analysis.

The following article will examine a specific type of information system, namely a land information system, which is institutionalized at a specific administrative level of government, the state. These systems have been primarily utilized by those public agencies and private groups involved in the land planning and management process.

The basis for discussion will be a comparison of two state land information systems: the Minnesota Land Management Information System and the North Carolina Land Resources Information Service. Their selections were based on several factors. First, one represents a well established system while the other is relatively new. Second, different data base formats are employed by each. And third, one system was completely developed by state agencies while the other was developed by and is currently leased from a consulting firm.

The first two sections will present an historical perspective of the two systems and highlight their major features. The final section will discuss the similarities and differences of the systems.

NORTH CAROLINA LAND RESOURCES INFORMATION SERVICE

The 1974 North Carolina Land Policy Act called for the creation of the Land Policy Council. A major duty assigned to the Council was to rememdy the "lack of a systematic collection, classification, and utilization of information regarding the land resource" (NCLRIS, 1977:1). In September 1977, the Council established the Land Resources Information Service (LRIS) to be based at the North Carolina Department of Natural Resources and Community Development in Raleigh, North Carolina.

LRIS's main function is to provide a system for entering and storing land related data collected by various agencies and private groups in a "consistent and compatible" manner. This system should also enable users to readily retrieve, analyze, and display the stored land information. A system which met these criteria was available from the firm of Comarc Design Systems, California. Although Comarc's system was relatively new, its user-oriented features and analytical capabilities were especially attractive to LRIS. Shortly after its inception in 1977, LRIS obtained the combination software and hardware system from Comarc Design Systems through a third party, five year lease purchase arrangement.

LRIS's initial year of existence was characterized by the undertaking of various pilot projects for government agencies. These projects were primarily intended to demonstrate to potential users the capability of the land information system. At the same time, the LRIS staff was able to become familiarized with the Comarc system and to identify and correct software problem areas.

A major pilot project was performed for the U.S. Department of Agriculture as part of the Soil Conservation Service (SCS) support to North Carolina's 208 Water Quality Program. This project entailed the digitizing of soil, land use and stream data for two sub-basins in North Carolina. Once stored in the system, software programs were applied to these data to determine the sediment loss in the sub-bacins. From these estimations SCS would be able to determine costs for management practices for reducing sediment loss.

Other important pilot projects included the plotting of metes and bounds of state-owned lands for the North Carolina Property Office; storing geographic coordinate references of

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geodetic control points in the system and plotting their distribution for the Geodetic Survey, North Carolina Department of Natural Resources and Community Development; and displaying and analyzing bougea values, subsurface stratas, cross sections, and contours of various geological beds for the Division of Land Resources, North Carolina Department of Natural Resources and Community Development.

SERVICES

LRIS's function is to assist federal, state, regional, and local government agencies, along with private citizens and businesses, in utilizing the land information system for land planning and management purposes. The LRIS staff provides users with the training and advice necessary for entering, storing, retrieving, analyzing, and displaying the desired data. This is an improtant duty owing to a basic concept espoused by LRIS that the collectors and users of the information should be the ones to perform the above functions. LRIS (1977:3) believes that "those who actually collect and use a particular type of data are most familiar with it, are able to enter that data into the system more accurately, and with a better understanding of its usage, than can someone unfamiliar with the data."

LRIS has, for certain agencies' projects, executed the entry, retrieval, and display processess without manpower assistance from these agencies. Other duties have included the demonstration of the systems' features to interested groups through tours at LRIS in Raleigh and presentations at formal seminars throughout the state. Research projects involving the identification of potential land planning and management applications and the development of new analysis techniques have been hindered by both a lack of funds and a concentrated effort in completing several pilot projects.

COSTS AND FUNDING

The original cost for leasing the Comarc Design System's software and hardware was approximately $4,500 per month. With recent expansion of the system, this fee has risen to $6,000 per month. To cover the initial leasing costs, funds were secured from several state agencies, specifically the Department of Natural Resources, Department of Administration, and Department of Cultural Resources.

A user fee system now provides the necessary funds for the system's leasing and operation costs along with the staff salaries of LRIS. The present rate for users of the system is approximately $30 per hour. This charge includes the costs of advice, training, system's operation, and materials for map production. However, LRIS is in the process of revising its user fee structure. Rates will, in the future, take into account the percentage of the system's resources utilized (e.g. digitizer use, CRT use, etc.), time of day one uses the system, and the amount of staff training and advice to the user.

HARDWARE

The hardware currently being leased by LRIS include the following:

1. A Data General Eclispe S-230 "mini-computer" with a current memory capacity of 320 KB.
2. A Zeta drum plotter, with a plotting accuracy of .005", and four different colored rapidograph pens for map display.
3. Two Talos digitizing tables with a .001" digitizing accuracy and a 60" by 44" dimensions.
4. Two Tektornix cathode ray tubes used for editing and previewing plots.
5. A standard line printer (300 lines per minute) for producing reports on various operations of the system.
6. Three keyboard terminals for software programming use.

The LRIS also has the capability of using the existing computer facilities of the Office of Management Systems in the North Carolina Department of Administration. The Administration Department's facilities consist of a large IBM 370/158 computer which could be used for large econometric modeling and processing and storage of large quantities of data.

LRIS personnel instruct clients on the techniques needed to use the system.
Photo N.C. Dept. of Nat. Res. and Comm. Dev.

DATA BASE FORMAT

Four different data base formats, points, lines, polygons, and grid cells have been employed by LRIS for entering and storing information in the system. With its abilities to be converted to grid cells and to enter areal data in its most basic form, polygons have been the most frequently used of the four formats. Data entry in its most basic form ensures other agencies and private groups of being able to utilize the stored information. If interpreted data[1] relevant only to the original users' needs were entered, the stored data's utility for other users would be limited.

The point data base format (a single x-y coordinate) has been used to depict geopogical bougea values and to locate and plot water quality monitoring stations. Meanwhile, the line data base format has been used to incorporate stream, road, and political boundary data into the system. Lastly, when entering land use categories from Landsat digital tapes, the grid cell data base format was employed by LRIS.

CODING, ENTRY, STORAGE

Automated techniques are utilized for data coding and entry into the system. A manual digitizer is used to determine the x-y coordinates of polygons, points, and lines. These coordinates are interactively entered into the system and temporarily stored on computer disk. Eventually the data contained on the disk will be transferred to computer tapes.

The labeling of the variable categories, which an individual point, line, or polygon represents, is also done interactively either during or after the digitizing process. In the latter case, Comarc's software provides a program for assigning labels to variable categories interactively with keyboard terminals.

The Comarc system enables one to assign an individual point, line, polygon, and grid cell a maximum of five different labels. For example, a polygon may be assigned for its first label a numeric code of "14" which would represent a major soil type. A second label, "5", may accompany the "14" label to indicate that this particular polygon is also on a slope between 10 and 15 percent.

With data being entered into the system by a variety of users, each utilizing a different data source, two geographic reference systems are employed to ensure uniformity and computability. The polygon, point, line, and grid cell data are converted to the State Planee Coordinate System prior to entry into the system. Also for the grid cell data base format, the use of a hierarchical grid structure with cell sizes ranging from very small to very large, has ensured the consistency and compatability of data stored in this fashion.

GEOGRAPHIC RETRIEVAL OF STORED DATA

Data can be geographically accessed by using the State Plane Coordinate Reference System or by a software program involving the overlaying of two or more data files.[2] The latter method involves overlaying a file containing the political boundary or natural boundary locations with a file, or files, containing the desired variable categories. For example, a file containing the county boundaries of the state may be overlain with a file containing soils data. A map could then be generated which would show those soils contained within the boundaries of the specified counties.

DATA BASE

Lris did not undertake extensive projects to define user data needs in the state and to collect and store these data into the system. Instead, LRIS decided to create its data base incrementally. They utilize the data collected and entered by various user agencies and private groups for their particular projects. This obviously ensures the usability of the data and also reduces LRIS's manpower needs.

Table 1 indicates the current status of the LRIS data base. County boundaries, subbasin boundaries, enumeration district boundaries, region boundaries, generalized soils (95 variable categories), general topography (50' contours) and 1970 population estimates by enumeration districts have been collected statewide and stored in the system. Land use for the state is currently being entered and will be completed by December, 1980.

Data has also been entered into the system for specific regions and counties in North Carolina (see Table 1). These data types include detailed soils, streams, land use, recreation sites, important farmlands, federally owned lands, and roads.

DATA MANIPULATION AND ANALYSIS

The Comarc system is based on the software program known as Comarc Planning Implementation System (COMPIS). COMPIS was designed by Comarc specifically to be used in conjunction with the hardware leased by LRIS. The COMPIS software package consists of seven major rountines; data base implementation, arcs, polygons, grids,

TABLE 1

LRIS DATA BASE STATUS

STATEWIDE

SUBJECT	ORIGINAL SCALE	FORM
Water Impoundments	1:250,000	Points
County Boundaries	1:500,000	Polygon
Subbasin Boundaries	1:250,000	Polygon
Enumeration District Boundaries	1:126,720	Polygon
Region Boundaries	1:500,000	Polygon
Generalized Soils	1:250,000	Polygon
Land Use/Land Cover (USGS LUDA Data to be available Dec. 79)	1:250,000	Polygon
General Topography	1:250,000	Grid
Hydrogeology	1:250,000	Polygon
1970 Population Estimates by Enumeration District	1:126,720	Grid
Zip Code	1:1,000,000	Polygon

SPECIFIC GEOGRAPHIC AREA

SUBJECT		
Detailed Soils (Wayne Co., New Hanover Co., portions of: Lenoir, Forsyth, Transylvania, Person, Sampson)	1:20,000	Polygon
Streams (Wayne Co., New Hanover Co., portions of: Forsyth, Person, Transylvania)	1:24,000	Lines
Land Use Portions of: Wayne, Lenoir, Union, Anson)	1:24,000	Polygon
Recreation Sites (Regions D, F, G, K, L)	1:126,720	Points
Important Farmlands (Wayne Co.)	1:20,000	Polygon
Federally Owned Land (Buncombe Co., Transylvania Co.)	1:63,360	Polygon
Roads (Portions of: Wayne Co., Lenoir Co., New Hanover, Transylvania)	1:24,000	Lines
Transmission Corridors (Nantahala-Pisgah National Forest)	1:63,360	Polygon
Stands and Compartments (Nantahala-Pisgah National Forest)	1:24,000	Polygon
Endangered Species Habitats (Nantahala-Pisgah National Forest)	1:24,000	Polygon
Trout Streams (Nantahala-Pisgah National Forest)	1:63,360	Line
Archeological Sites (Nantahala-Pisgah National Forest)	1:63,360	Point

topography, lines, and points. Each routine is comprised of various options or subroutines for analyzing and manipulating the data. These seven routines and their more important options are discussed briefly below.

1. Data Base Implementation - Data base implementation has two subroutines; the first enables one to digitize raw source data from maps or photographs while the second allows the digitized maps to be scaled to a desired storage size.

2. Arcs[3] - The main purpose of the "edit file" option is to remove operator errors which arose during the digitizing process. This is accomplished interactively by displaying the digitized arcs onto a CRT screen. Operator errors are removed by hitting the proper sequence of characters on the CRT keyboard. The "change map parameters" option allows one to change the minimum x and y values, lengths of arcs, number of nodes[4], number of arcs, file name, and data type. Redundant points, which occur when two arcs share a common border, can be removed by the "thin arc" subroutine. The "ZETA plot" subroutine provides the user with a choice of the scale of the output map, size of the labels, minimum size of arcs to plot, title block, and plotting with labels.

3. Polygon - Similar to the "Arcs" program, the polygon program possesses subroutines which allow one to change map parameters, remove digitizing errors interactively, thin files by removing redundant points and produce a map by use of Zeta Drum Plotter. The polygon has additional options for manipulating and analyzing stored data. A subroutine will calculate the acreage summary of polygons by variable categories. Another option allows one to extract polygons from a file based on five different criteria (sequence number, label number, minimum areas, or user defined area) and to graphically display these polygons.

   The "overlay" subroutine is one of the more important options of the polygon program. This option will find and combine the characteristics of two maps that occupy the same geographic area. The "window overlay" subroutine permits the user to define a geographic window to be overlain on a map. This would reduce the output map to the size of the user defined window. Additional polygon data can be entered into the system with the "update map" option. Finally, a subroutine exists which converts polygon data to the grid cell data base format with the user being able to select the number of columns and rows, and grid cell size.

4. Grid - The Grid program, like the Arc and Polygon Programs, has similar subroutines which enable one to change map parameters (including grid cell size), plot a map at any designed scale, calculate acreage summary of grid cells by variable categories, and overlay two or more grid files to produce a composite map. However, the grid program contains several features not present in arcs or polygons. One subroutine will search for extreme grid cell label values and create a new file representing only this label. Another option allows the user to select a label as a seed and to create proximity rings around the seed label. Other interesting subroutines include the creation of shaded perspectives and three dimensional graphic representations of grid cell files.

5. Topography - The topography program also possesses editing, map parameter change, Zeta plot, overlay and label options. In addition, the topography program has subroutines which do the following:

   Calculate the percentage of slope of a given area.
   Compute aspect.
   Determine direction of sun and wind exposure of a given area.
   Calculate and plot the drainage pattern of any area where topography is known.
   Calculate the "viewshed" from any point or linear feature.
   Perform a cross section of topographic data at any scale between any two points on a site.
   Plot contours at any contour interval regardless of the interval in which the map was originally digitized.
   Calculate "cut and fill" volumes and show the elevation on a line printer map on each point on the site before and after grading.

6. Point and Lines - The point and line programs posses features similar to the above programs. These include the functions of editing, thinning, summarizing lengths, extracting lines and points, plotting, overlaying, and labelling.

DATA DISPLAY

Computer mapping with the Zeta drum plotter represents the primary means for data display. Maps can be plotted at any scale, regardless

of the original scale of the digitized map or photograph. The system allows a multitude of different colored shadings and labelling. Maps may also be displayed on the two Tektronix screens for editing and previewing purposes.

MINNESOTA LAND MANAGEMENT INFORMATION SYSTEM

During the 1960s and 1970s, the legislative climate in Minnesota gave rise to many progressive laws regarding the management of the state's resources. To effectively implement these various measures, resource data needed to be collected, stored, analyzed, and displayed. The most efficient means to handle these vast amounts of data was through the use of a computerized data bank and mapping system.

In 1967, the Minnesota Outdoor Recreation Commission funded the University of Minnessota's Geography Department to collect data on privately owned lakes in the state. The types of data requested by the Commission included location of seasonal and permanent homes, dominant soil and vegetation types, lake ecology, and road accessibility. Two years later, the Geography Department had secured this information for more than 2,000 lakes. This data was encoded on some 38,000 grid cells, with each cell being 40 acres in size. The cell data was then stored in a computerized data bank and, with several software routives, was analysed and displayed as maps.

The success of the data bank and mapping process encouraged other agencies to utilize this system. In 1968, Minnesota's State Planning Agency (SPA) decided to obtain land use information for the entire state and to handle the data in a similar fashion to that of the University of Minnesota's lake inventory. The 40 acre size grid cells were again employed, and by 1971, the state land use inventory was completed and incorporated into the computerized data bank. Over the next few years, additional state funds were appropriated for entering new elements into the ever growing data bank; known as the Minnesota Land Management Information System (MLMIS). These new elements included political, water, highway, geological and planning data.

SERVICES

In July, 1977 the MLMIS was moved from the University of Minnesota to the State Planning Agency (SPA), where it was situated at the newly created Land Management Information Center (LMIC). The principle function of the LMIC is to train and advise state and private agencies in the use of MLMIS. Other duties of the Center include centralizing the state's mapping and remote sensing information, maintaining the data base, developing new analysis tools, and entering new data. Although the Center will assist local governmental agencies in accessing MLMIS, they have mainly relied on the state's 13 regional planning commissions to provide this service.

COSTS AND FUNDING

The twelve year development cost for MLMIS was approximately $1,800,000. To cover the cost, funds were secured from a variety of public and private sources. The major contributor was SPA (47%); other sources included the Minnesota Information Resources and Development Fund, the Legislative Commission on Minnesota's Resources, the Land Exchange Review Board, the Rockefeller Foundation and the Center of Urban and Regional Affairs, University of Minnesota.

Beginning with the 1977 fiscal year, the development costs of MLMIS were funded through a state legislative appropriation as a budget item in SPA. Operation costs for a particular project are currently covered by a user fee system. The most recent rate for the user services of training and advice is $10 per hour, while computer and supply time is $15 per hour. Charges are also levied for map production and summary reports. A 50-page computer-generated report costs approximately $100.

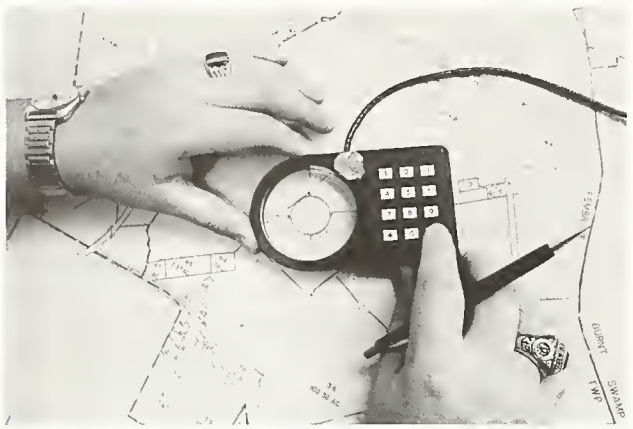
HARDWARE

MLMIS presently employs the following hardware:

1. An IBM computer for storing and processing land information.
2. Several cathode ray tubes for editing and preview purposes.
3. A standard line printer for generating preview maps and reports.
4. Several digitizing tables for encoding and entering data.
5. A plotter for producing final map versions.

MLMIS DATA BASE

The grid cell was chosen as the format for encoding and storing data. During MLMIS's existence, the most frequently used grid cell size has been 40 acres. The popularity of the grid cell and the 40 acre size are due to several reasons. First, as a result of the U.S. Public Land Survey, the 40 acre parcel has historically been the basis for allocation of land in the state. Government tax and property records in Minnesota are referenced by the Public Land Survey designations. But



A data encoder manually digitizes a property map.
Photo N.C. Dept. of Nat. Res. and Comm. Dev.

most important, the 40 acre grid cell approach is a convenient format for computer mapping and analysis of data encompassing statewide and regional areas. Thus, the MLMIS data base format was designed for planning studies at the state, county, and regional levels, and was not intended for planning investigations at the municipal or urban levels.

However, for those users desiring smaller cell sizes, MLMIS possesses the capability of encoding and storing data with cells of 2.5 acres and less. Conversely, users may find the 40 acre grid cell too small for their purposes. MLMIS provides these users with the option of utilizing a 5 kilometer grid cell (approximately 10 square miles).

CODING

To convert raw data to grid cells, a transparency is divided into grid cells and is manually overlayed onto the map or photograph containing the information. Each cell is then examined and the predominant data type under investigation within the cell is recorded as a numeric value on coding sheets. The information on the coding sheets is transferred to computer cards, for eventual entry into the system.

However, because manual coding is a tedious method for data entry, a second process has often been employed, called digitization. A manual digitizer is used to trace the boundaries of the variables data category as a series of polygons. These polygon boundaries are automatically entered into the system and are converted to grid cells by a software program.

In addition to the coding of the variables categories, a geographic referencing system was required for each cell. A fourteen digit number representing the state, county, minor division, section and parcel is assigned to uniquely identify each cell. Also, centroids with latitude and longitude coordinates are situated in each minor civil division, and these are entered into the system.

DATA MANIPULATION AND ANALYSIS

The computer software system which serves as the basis for MLMIS is the Environmental Planning Programming Language (EPPL). A Fortran based language, EPPL was designed specifically for MLMIS. It is comprised of several routines and a number of subroutines which analyze and display data. EPPL's three major routines are file manipulation, map compositing, and geographic relationships.

The two subroutines under file manipulation are "window" and "scale change". The window option enables one to choose a section of a larger map to be used for further analysis. For example, a township file can be retrieved for analysis from the larger county file. The scale change subroutine allows the user to reduce or enlarge the area found within the data cells. With this option, a user can combine four 40 acre grid cells to a 640 acre grid cell. Conversely, one might change 40 acre cells to 2.5 acre cells.

The second major routine, map compositing, consists of three different subroutines. The first two, "bigtab" and "flow", permit the user to create a new map based on the combination of several variables. For example, a map might be constructed which would display all cells that are forested land use, of the oak forest type, and on lakeshore which is not publicly owned. Or a map might be devised to depict only the union of two variable-categories, such as a map displaying a certain soil type on a certain percentage slope. The third subroutine, "score", allows the user to assign a numerical score to various variable categories. These scores would represent the relative importance of the variable category to the particular process in question. A map could then be generated which would indicate the effects of weighing variables.

Finally, the geographic relationship routine enables the user to analyze many variables for large areas and then graphically display the results. This routine allows one to locate an ecological "edge" between cover-types and to find a "viewshed".

DATA DISPLAY

Computer mapping represents the primary means for displaying information of the MLMIS. Several data display devices have been utilized, including the standard line printer, the desk top interactive terminal, and the dot plotter.

Designed primarily for producing output for typical computer programming runs, the line printer has often been used to produce MLMIS maps. Each letter or character on the device represents a data cell. But, because characters and letters possess rectangular rather than square dimensions, the map output is distorted. Therefore, maps generated by this device often serve as an interim map for checking coding errors and for initial inspection of analysis maps. Tabulations and statistical tables are also produced by the line printer.

A second output device is the desk-top interactive terminal or cathode ray tube (CRT). Due to scale distortions in its map display, this device is also used for preview and editing purposes. The dot plotter is the most effective of the devices in terms of map accuracy. It enables one to manipulate dot patterns and thus create grey-tone mapsymbols. The dot patterns can range in size from .01" by .01" to .25" by .25". Besides dot patern type maps, the plotter is capable of generating three-dimensional maps.

DATA

Data for 13 different variables have been collected for the entire state utilizing the 40 acre grid-cell format. Each of these 13 variables possess numerous characteristics or data levels which are assigned to an individual cell. For example, for the forest variable, a cell may be assigned one of nine different data levels (white, red, or jack pine, spruce-fir, oak-hickory, elm-ash-cottonwood, maple-birch-basswood, aspen-birch, unproductive, reserved, non-forested). Other statewide variables in MLMIS include:

- Township
- Minor Civil Divisions
- Public Ownership Lands
- Type of Acquisition of State or County Owned Land
- Highest Recommended Use of State or County Owned Land
- Recommended Disposition of State or County Owned Land
- Management Unit Status of State or County Owned Land
- Land Use
- Water Orientation
- Highway Orientation
- Soil Landscape Unit
- Geomorphic Regions

For certain areas of the state, data has been collected and stored at grid cell sizes smaller than 40 acres. One such area, the Lake Superior shoreline, has been inventoried with a 2.5 acre grid cell format. The shoreline data collected includes the variables of slope, slope orientation, soil associations, soil series, water system, forest cover, land ownership, and land use. Meanwhile, the larger 5 kilometer grid cell has been employed for encoding and storing data on population distribution, crop and livestock production information, climate data, and watershed boundaries.

DATA SOURCES

MLMIS designers' policy has been to identify and locate useful data already available within the state rather than undertaking extensive inventories on their own initiative. The major data sources for MLMIS have been data collected by various levels of government including county, state, and federal. However, if a particular data type is highly desirable by potential users, MLMIS will initiate a data collection project.

CLASSIFICATION SCHEME

By accepting data collected by other agencies, the classification schemes employed by these agencies were adopted for MLMIS. This eliminates the bias associated with managing personnel of the MLMIS devising their own classification scheme. Another advantage is that the primary data collector would be in a better position to describe the methods of data collection.

USERS

The users of MLMIS have primarily been those federal, state, local and private agencies involved in the land use planning and management process. Several of Minnesota's

Operator interactively edits a digitized map on a Tektronix cathode ray tube.
Photo N.C. Dept. of Nat. Res. and Comm. Dev.

state agencies, particularly the Department of Natural Resources and the State Planning Agency, have utilized the system for numerous projects, including an atlas of resources and settlement, a coastal zone management atlas, and studies of cropland resources.

COMPARISON OF THE MLMIS AND LRIS

After reviewing the preceding two chapters, it is apparent that many differences and similarities exist between the MLMIS and the LRIS. This section will examine the similarities, and will discuss the relative merits of the systems differences.

SIMILARITIES

Funding Initial funding for the development costs of MLMIS and the leasing cost of the COMARC system were secured from state governmental agencies. This similarity stems from the greater potential for use of the system which the state agencies have when compared with smaller agencies and private groups.

Design and Services The two systems were designed so as to allow clients with little background in computer programming and information systems to readily enter, retrieve, analyze, and display land related information. By allowing users to perform these functions, data are entered more effectively due to their familiarization with the data's useage. Also with a user oriented approach, staff size and budget needs are less. Service rendered by MLMIS and LRIS similarly consist of training and advice, with the cost of these services being nearly identical in the two states.

Users The major users of MLMIS and LRIS have been state agencies for several reasons. First, due to their physical locations in their respective state capitols, state agencies find these two systems readily accessible. More importantly, state agencies have the financial means and necessary personnel to take advantage of the systems' capabilities, which smaller local agencies and private groups often lack. Lastly, state projects usually involve the handling of large amounts of land-related data, thus making processing by a computerized information system economically feasible.

Digitizing Problems LRIS and MLMIS share a common problem concerning the digitizing process. Errors frequently arise while human operators move a digitizing cursor around the boundaries of the variable in question. It has been estimated that for every 20 hours of digitizing, nearly 10 hours of editing and redigitizing are necessary to correct these errors.

Classification Scheme A MLMIS and LRIS policy has been to adopt the classification schemes developed by the data collecting agencies. Both felt that employing the information collectors' schemes would eliminate potential bias problems which could develop if MLMIS and LRIS staffs were to devise their own schemes.

Data Collection With the prohibitive costs of data collection projects, MLMIS and LRIS have made concerted efforts to use existing collected data for eventual entry into their systems rather than securing this information on their own.

Data Types Presently land use represents the only similar data type entered into the MLMIS and LRIS on a statewide basis. Given the different geographic areas they serve and associated environmental and land use concerns, it is understandable that only one common statewide data type exists. Both systems have collected data for smaller geographic areas, such as counties and watersheds. Similar data collected at these more detailed levels have included soils, land use, and hydrological information.

Software Similar software analysis routines are utilized by the two systems. Both allow the user to generate a plotted map at various scales, to define a geographic window to extract land data, to graphically display the union and weighing of two or more variables, to calculate acreages for a specific variable, and to determine an "ecological edge" (where two vegetative cover types merge) and viewshed.

DIFFERENCES

Services Minnesota's regional planning agencies serve as the main nexus for the local governmental agencies and the MLMIS. Conversely, LRIS staff have attempted to familiarize local agencies with the system. However, due to the vast numbers of local agencies in the state and the small staff size, LRIS finds itself at a disadvantage in trying to inform these agencies of the system's capabilities.

Software Development The software programs for entering, storing, retrieving, analyzing and displaying land information and the specialized land information language (EPPL) were designed by MLMIS over a ten year period. The principal advantage in developing one's own system is that the system can be designed to meet particular needs. In Minnesota's case, with the "township and range" land-ownerships being a strong determinant in the cultural land patterns, an information system was designed to take advantage of this phenomena. However, the costs of developing a system from the ground

up, as evidenced by the nearly $2 million price tag for MLMIS, are quite high. Furthermore, the lead time to become operational takes several years.

The North Carolina land information system avoided these problems by adopting a previously designed system from a private consulting firm. LRIS was able to undertake pilot projects within several months of the installment of the software/hardware package. LRIS choose this route for several additional reasons. First they felt that a consulting firm would have more experience and expertise with information systems than their newly formed unit; and second, it greatly reduced their need to hire additional staff for system development.

However, the consulting firm approach is not without its drawbacks. At the outset, LRIS had to raise a considerable amount of money for the leasing of the COMARC system. Due to the "secret recipe" of the software programs, LRIS has a continuing dependency on COMARC consultants when modifications are sought.

Leasing vs. Purchasing LRIS leases its software and hardware while MLMIS has purchased hardware and developed its own software. When new computer technology advances occur, the leasing approach will allow LRIS to switch to new, more attractive systems. However, over the long run, the leasing costs may exceed the cost of purchasing a total system. With the enormous amounts of money and effort devoted to the development of MLMIS, Minnesota is reasonably committed to using this system for many years, without any real opportunity to change.

Data Base Format LRIS possesses four different data base formats, polygon, point, line, and grid cells, while MLMIS relies solely on the grid cell format. The advantages of entering data in polygons rather than in grid cells are as follows:

1. accuracy of the data is retained;
2. variable boundaries are more precise when outputting in map form;
3. polygons can be readily converted to point, lines, and grid cell format; and
4. more subroutines exist for data manipulation and analysis.

The drawbacks in using this format are that polygons are not conducive to mathematical modeling, require complicated software programs for data handling, and digitizing equipment for entering variable categories.

The major advantages in using the grid-cell format include the following:

1. simple data processing involved;
2. change and update accomplished easily;
3. facilitates line printing output maps;
4. modeling is easier for it does not require precise boundary locations;
5. encoding can be done manually; and
6. less computer time and space are needed.

The major disadvantages of a grid cell approach are as follows:

1. poorer appearance of grid cell based maps;
2. adopted grid cell size will be a compromise that might be less suitable for some of the data;
3. imprecise representations of areal boundaries;
4. loss of accuracy and generalizations;
5. difficulty in representing points and lines; and
6. inability to depict dense data effectively without reducing to smaller grid size.

In comparing polygons with grid cells, the polygon data base format is a more effective format for handling land related data. Maps generated from polygons closely resemble traditionally hand drawn maps, which the average individual better relates to than maps produced from a grid cell format. More importantly, more analysis tools can be applied to polygon encoded data. Futhermore, one is able to convert to grid cells from polygons and enjoy its advantages whereas the switch from grid cells to polygons is not feasible.

Hardware A small "minicomputer" processes the land related information for LRIS while MLMIS employs a large computer. The MLMIS computer possesses greater storage capacity as well as the ability to process large amounts of data more quickly than the LRIS minicomputer. With this large computer, MLMIS's staff has a better response time to interactively feed commands during the editing phase. LRIS is presently hampered by a slow response to editing commands.

Geocoding MLMIS's geocoding procedure consists of assigning a 14 digit code representing the state, county, minor division, section, parcel and centroid number which the grid cell appears in. Meanwhile, LRIS, by utilizing the state plane coordinate system ia able to more rapidly accomplish to geocoding task.

Software Programs LRIS has greater analytical capabilities than MLMIS. The data base formats of LRIS lend themselves to a greater variety of analysis techniques and, being a relatively new system, COMARC has incorporated many of the current state of the

art analysis tools. These additional LRIS software features include the abilities to: calculate percentage of slope, compute aspect, determine sun and wind exposure of a given area, calculate the drainage pattern, perform cross sections, plot contours, and calulate cut and fill volumes.

Data Base MLMIS has undertaken projects to collect and enter land related data without client funding. Once stored in the system, this information is readily available for retrieval by all interested groups. MLMIS was able to fund these projects by virtue of being a budget item in the state. However LRIS does not have this institutional arrangement. Instead they must rely on user fees to cover the data entry costs of projects. Consequently, only those user agencies with the financial means and available personnel are able to readily utilize the system.

Agencies with smaller operating budgets and limited staffs have tended to wait until an agency with the necessary funds and manpower have accomplished the time consuming and expensive tasks of data collection, entry, and editing. Once stored in the system, these smaller agencies would have access to this information and be able to bear the costs of data retrieval, analysis, and display.

As discussed above, MLMIS and LRIS possess particular strengths and weaknesses. For MLMIS, its statewide data base and consulting arrangements with local governments represent the strong points of the system while the grid cell data base format and limited analysis techniques are drawbacks. In the LRIS case, the polygon data base format, software analysis capabilities, and map display comprise its major assets while the slow editing process, few contacts with local governmental agencies, and data base approach are its limiting features.

NOTES

1. Interpreted data is raw data which has been categorized by the user. For example, major soil types data may be classified according to its erodibility (high, medium, and low) and entered into the system according to its erodibility criteria.
2. A data file refers to stored data on computer tape.
3. An arc is defined as a line between two digitized x-y coordinates.
4. A node is defined as a point where three lines come together.

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Janet E. McKinnon

The Secondary Impacts of Rural Water System Installation

Rural water systems have been welcomed by many North Carolina citizens seeking a dependable source of high quality water. There is a growing concern, however, that the installation of rural water systems may induce sprawl development with negative social, environmental, and fiscal repercussions for rural areas. This report examines the relationships between public investments and rural growth, and then analyses the potential impacts induced by that growth. It assumes that explicit consideration of secondary impacts during preproject evaluation will help avoid undesired and unplanned outcomes of rural capital improvements.

The pace of rural development has been influenced by a number of significant economic and social changes. Nationally, alterations in farm methods and technology have increased farming efficiency and resulted in a decline in the farm population. The demographic shifts to urban and nonfarm rural populations, while rapid, have not been neatly balanced. Some agricultural areas have experienced sudden and severe population losses accompanied by the retreat of business firms and a loss of nonfarm employment opportunities. Those local governments have had to cope with declining tax revenues and increasing costs per capita for necessary public services (Maddox, 1973:3). In North Carolina these trends are reflected in rural residents' perceptions of community problems. Rural North Carolinians are concerned about: employment opportunities, health care, social services, cultural opportunities, and community services, including the adequacy of water and sewage facilities (Christenson, 1974:10).

Paralleling this general decline has been a sense of profound regret that rural options are being closed to those who prefer traditional rural values over those of urban areas. In response to these problems, organizations representing rural interests have urged public action to help raise rural incomes and introduce educational, health, and recreational opportunities to depressed areas. Under the administrations of Presidents Kennedy and Johnson, a series of federal programs have been launched to improve the quality of rural life. With the Agricultural Act of 1970, rural development was adopted as a national objective: "Highest priority must be given to the revitalization and development of rural areas" (Maddox, 1973:14). The Rural Development Act of 1972 took steps towards fulfilling this commitment. It proposed to speed economic growth, create job opportunities, improve the quality of life, and protect the environment of the small towns, villages, and farm communities in rural America.

A special provision of the 1972 act authorized the Farmer's Home Administration (FmHA) to encourage growth by increasing the available supply of business and capital improvement loans to rural communities. As a result, funds for rural water systems have been readily available. However, the distribution of private investments following the installation of the water systems is left to the market processes of the free enterprise system, with no procedure to insure optimal public/private development planning. This approach to development decisions is shortsighted and is now receiving more intensive scrutiny than when the Rural Development Act was first considered.

Other rural areas in North Carolina, particularly those in proximity to urban areas, have experienced rapid development in recent times. This growth has resulted in new jobs, schools, hospitals, and increased tax revenues for rural counties and small towns. Because most of the rural population increases represent nonfarm residents, there is also greater economic, social, and cultural diversity in many small

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communities and less pressure for talented rural residents to seek urban opportunities. For these reasons, rural development has been applauded and encouraged.

Rural growth, however, may also exact a toll. Haphazard rural residential sprawl may be aesthetically unappealing and can lead to environmental degradation. Sudden demands for services may require unexpected capital outlays by local government. Pressures on land values can result in the conversion of tracts of productive agricultural land to residential uses. Finally, tension can form between long-term residents who have a strong sense of community pride and newcomers who may know little of local customs or history.

In North Carolina, the Rural Land Use Planning Committee (1978:1) is concerned about the trend of unguided rural growth. According to the Committee, "The rapid rise of the rural nonfarm population has created vast acreage of low density rural sprawl across North Carolina. Rural sprawl is a major contributor to rural land use problems." The problem of rural growth and sprawl is, by nature, a subjective one. Growth, per se, is neither good nor bad, but must be viewed in terms of eventual secondary impacts. Growth-induced changes can then be evaluated as positive, such as increased income, or negative, such as crowded schools or failing septic tanks. Usually the total effect of these impacts is mixed, often unclear, and disputed. Although the installation of public infrastructure has been blamed for directly causing rural residential sprawl, the relationship is more complex. Depending upon local conditions, infrastructure will induce a particular mix of impacts, which then must be judged according to an appropriate set of criteria.

The planning process is a means for systematically analyzing possible growth patterns and induced impacts, and attaching values to the outcomes. The first planning priority is to identify and establish local goals and objectives. This provides a framework for comparison during the impact analysis, which translates growth projections and development scenarios into a statement of expected economic, social, and environmental impacts. As a final step, public action can influence the type or timing of development to avoid or lessen negative impacts.

Rural water system installation, as a public capital improvement project, influences the community growth pattern. By applying the rural planning process before deciding to proceed with water system investments, public agencies could insure that an investment to solve a water supply problem does not unexpectedly spawn others. Rural planning, however, has not been widely practiced in North Carolina. As a discipline, rural planning is still in its early stages, largely because of a bias towards research in urban planning methods. Planners have tended to ignore rural growth problems, concentrating instead on urban issues which seem more urgent. Frederic Sargent (1976:1) has described a typical urban planning approach in which, "The first step is a projection of growth, jobs needed, and proposed industrial and commercial growth. Land use is then planned to satisfy those projected needs. Any land left over is colored green and labeled open space."

Citizen opposition to rural planning has been another obstacle. A prime factor in rural residential choice is the avoidance of what is perceived as governmental interference. Any public action which might limit future options or decrease the value of private property is traditionally viewed with suspicion. However, the rapid population growth in rural areas is now leading to an awareness that foresight and planning may be necessary in "green areas" so that the very amenities which rural residents treasure are not destroyed.

RURAL DEMAND FOR WATER

Recent North Carolina demographic trends indicate that major changes in the rural population profile have been taking place (see Table 1). The urban fraction of the population has increased since 1940, partly reflecting the drastic decline in the percentage of the rural farm population. The farm population fell from nearly 47 percent of the total state population in 1940 to only 7 percent in 1970. During those same years, the rural nonfarm segment rose from 26 percent to 48 percent. In 1970, rural nonfarm residents represented 87 percent of the rural North Carolina population. Experts expect this trend to continue (Danielson, 1978:3).

The rural population relies heavily on individual wells for its water supply. The North Carolina Department of Natural and Economic Resources (DNER) estimated in 1977 that 40 percent of the state population obtains water from individually-owned wells or springs. Projections of rural water demand consider two trends. Although the total population served by individual systems will decrease as rural areas invest in public supply systems, an increase in water use per capita will result in slightly increased individual system water demand. The State estimates that total domestic rural water requirements will rise from 104 million gallons per day (mgd) in 1970 to 121 mgd in 1990 (North Carolina Department of Natural and Economic Resources, 1977: 3-C-13).

TABLE 1

TRENDS IN NORTH CAROLINA POPULATION DISTRIBUTION

Population Distribution	Percent of Total Population			
	1940	1950	1960	1970
Urban	27.3	33.7	39.5	45.0
Rural Farm	46.4	33.9	17.7	7.3
Rural Nonfarm	26.3	32.4	42.8	47.7
Total	100.0	100.0	100.0	100.0

Source: U.S. Census.

The ability to obtain high quality water in rural areas is being strained as increased demands are placed on the water table. Although no health hazard is usually involved, complaints of taste and odor are commonly reported problems in the state. Since correction is expensive and is the responsibility of the individual household, most rural families adapt to the situation.

A far more serious threat, however, is the problem of groundwater contamination. The greatest risk comes from poorly sited septic tanks that leak effluent into the water supply. The State report cited above notes, "This problem does not affect large numbers of people." An altogether different view of the North Carolina situation is taken by the North Carolina Department of Administration (1973-1975) in a series of plans which assesses future water resource needs for each region in the State. A review of six of the plans reveals that county sanitarians in four of the six regions reported that "a significant" number of families within their region were without safe water supplies and were subject to health hazards associated with polluted water.

An unreliable water source may also be detrimental to local growth and an impediment to the attraction of commercial and industrial development. Many rural communities have a positive attitude towards growth and the accompanying jobs, establishments, tax revenues and sense of vigor. A demand for a dependable, high quality water system is understandable in terms of high priorities attached to economic growth, as well as public health standards.

SECONDARY IMPACTS OF RURAL WATER SYSTEMS

Review of previous research on problems associated with uncoordinated rural water system installation reveals that although the issue is of concern, a general consensus of the nature and the scope of the problem does not emerge. In accordance with the general model of secondary impact analysis (see Figure 1), studies can be divided into two types for analysis. The first type attempts to determine the strength of the relationship between water system installation and induced growth. These studies include a group that attempts to examine the relationship in a descriptive manner (nonsystematic), and a group that quantifies the relationship through the use of statistical models (systematic).

A second type of research is the result of attempts to estimate the impact of growth. These studies are all of the "nonsystematic" type due to the location-specific nature of growth impact analysis. The final step in the research, evaluation of impacts, must come on the local level and be based on comparison between local growth objectives and an analysis of the expected impacts.

WATER SYSTEM INSTALLATION AND INDUCED GROWTH

There is a relationship between public infrastructure investment and growth, but, in the case of water systems, the strength of that relationship is not well understood. Much more attention has been given to explaining and understanding the associations between sewer, highway and mass transit ex-

tensions and induced growth patterns (see Urban Systems Research and Engineering, 1976; and Tabors, et al., 1976). Much of the literature concerning rural water systems and induced rural population growth draws on previous research into the general nature of secondary impacts.

Individual decisions which, in aggregate, lead to particular land use patterns are highly complex in nature. A household considering a move to a rural area will weigh many factors, including employment opportunity, property values and convenience, as well as the availability of public services, such as water, sewer, schools and well-maintained roads. Grey (1978:11) identifies another factor, the "rural mystique," as important in the decision process, based on the finding that a non-quantifiable factor seems to favor rural location. In North Carolina, Christenson (1974) found in a statewide survey that 17 percent of the people living in the state prefer to live in the country and another 57 percent want to live outside the corporate limits of a town, but within a 15 minute drive. Thus, there seems to be a strong preference for rural living.

"A PRIME FACTOR IN RURAL RESIDENTIAL CHOICE IS THE AVOIDANCE OF WHAT IS PERCEIVED AS GOVERNMENTAL INTERFERENCE."

In an analysis of the growth inducement effects of various public investments and policies, Urban Systems Research and Engineering (1975:38) concluded that land use patterns, "... are the result of a complex set of historical, economic, social, and political interactions. No single factor can be isolated as the cause of current land use practices, nor is it likely that modifying any particular governmental policy would result in radical changes in future land use patterns. The role of (infrastructure) must be seen as contributory rather than decisive."

Because the significance of a water system in determining land use patterns is highly affected by other variables, it is difficult to determine precisely the growth inducement effect of an individual investment decision. Nevertheless, it is generally felt that some process exists. As such, the problem of predicting growth is one of "attribution--the determination of what part, if any, of urban growth can be ascribed to public investment" (Environmental Impact Center, 1974:3).

A *New York Times* article in 1975 examined rural growth stemming from the Farmer's Home Administration financing of rural water systems and reported a very strong relationship between the installation of water lines and growth. According to this report:

> ...the new water systems, which have multiplied spectacularly in the last ten years because of an expanded Federal program have brought more than pure water to the American countryside. They have also brought growth...speculators have discovered that a rural water system is a sure fire way of speeding development and selling lots (Reed, 1975).

A survey of rural water system managers operating FmHA financed systems found a strong perception of growth directly attributable to water line extension. Survey respondents felt that rural water systems had facilitated increased housing in rural areas (Landry, et al., 1973:20). In addition, the study indicated that water systems were viewed as producing increases in the price of real estate.

Specific locational factors are important before growth predictions can be formulated. In particular, when water supplies in a region are generally inadequate and individual wells are less feasible, growth is more dependent upon centrally supplied water. The impact of water systems on development in areas operating under this constraint is more likely to be significant and predictable (American Society of Planning Officials, 1977:42). In view of the fact that many county sanitarians in rural North Carolina counties report that an increasing number of families are without a safe water supply, the expected increase in rural nonfarm residents may be constrained to areas serviced by water systems. This could make the placement of water lines of crucial interest to prospective rural real estate developers.

"ALTHOUGH NO HEALTH HAZARD IS USUALLY INVOLVED, COMPLAINTS OF TASTE AND ODOR ARE COMMONLY REPORTED PROBLEMS IN THE STATE."

Empirical tests of the relationship between various locational influence factors and the actual location of rural growth are few. Although factors which influence growth are identifiable, they are diffucult to separate and weigh. It is also difficult to generalize empirical results from one region to another (American Society of Planning Officials, 1977:42).

One systematic study by Weiss and Kaiser (1968) analysed five factors which tend to influence regional residential location decisions. Their study of the North Carolina Piedmont Triad region found that the relative importance of the five independent variables could be grouped as follows:

First rank: Highly significant influence

Access to major road
Contiguity to urban use

Second rank: Significant influence

Agricultural capability of undeveloped land
Access to public water system
Distance to nearest high value corner

The five variables explained 89.5 percent of the regional land use pattern; however, as the authors note, the findings relate to one regional cluster for one period of time and may not reflect other areas even of similar size. Nevertheless, it is noteworthy that in a study of rural residential location in the vicinity of major multipurpose reservoirs, Burby, Donnelly, and Weiss (1972) found that access to a water system was a major factor shaping the location of residential development. In the Lake Sidney Lanier, Georgia area, for example, access to a water system explained more of the location of residential development than any other factor considered, including topography, ground cover, distance to major roads, schools, employment and nearby urban centers, and access to a public sewerage system. In a related study of land value changes around an authorized reservoir near Durham and Raleigh, North Carolina, Burby, Donnelly and Weiss (1973) found that the availability of a water system was a major factor in determining the price of rural land.

In a pilot study of rural residential choice, Gray (1978:11) asked exurbanites to rate the importance of the availability of public services, lot size and arrangement, monthly mortgage, and distance to work and shopping in terms of desirability, economy, and convenience. The survey, which included water and sewer facilities and improved public roads, found that within the public service category, hard surfaced public roads were more important in determining residential location than the presence or absence of public water and sewer.

A study of conversion of rural land to residential uses in the metropolitan fringe of Denver, Colorado used the EMPIRIC model to find the importance of public investment relative to other factors influencing land use change. Results showed that new water service explained 6.8 percent of the change, as compared with 23 percent of the change attributable to new sewer service, and 4.6 percent to the existing highway pattern. In the analysis, however, the authors suggest that these proportions are likely to change so that, "With a growing concern over water, public systems have begun to play an increasingly important role in the urban development process" (Environmental Impact Center, 1974:5).

"...HARD SURFACED PUBLIC ROADS WERE MORE IMPORTANT IN DETERMINING RESIDENTIAL LOCATION THAN THE PRESENCE OR ABSENCE OF PUBLIC WATER AND SEWER."

In summary, it appears that rural water system investments, while not the major factor accounting for rural development, contribute to rural growth and the location of new residences outside of built-up areas. The effects of this population distribution are discussed below.

THE EFFECTS OF INDUCED GROWTH

The issue of secondary impacts which result from rural growth is of critical interest to planners, public officials and rural residents. Concentration on one set of impacts, either the good or the bad, leads to a misrepresentation of the implications of growth. For this reason, it is important that the connection between growth and secondary effects is understood, and that the range of effects is explored.

In instances of induced sprawl, environmental degradation may result when rural housing density is increased. Although a public water system is designed, in part, to protect households from contaminated or depleted groundwater, extensive sprawl development attracted to the serviced land will create several other environmental problems. Stormwater runoff is greatly increased following the conversion of land from an undisturbed or agricultural state to residential uses. This increases the threat of surface water pollution and flooding. Serious erosion problems and local stream sedimentation can be the eventual result. Lawnmowing activity and the use of lawn fertilizer can increase the eutrophication rates of area ponds. Fragile or unique habitats are impacted by shifts in land use patterns. Since conversion of land from residential to wilderness or agricultural uses rarely occurs, a loss of habitat or farmland is a permanent impact.

"RURAL RESIDENTS DO NOT DEMAND THE SAME HIGH LEVEL OF PUBLIC SERVICE AS URBAN DWELLERS."

Another major concern is the effect of growth on the future demand for costly public services, such as police and fire protection, sewer service, schools, and hospital facilities. Below certain threshold densities, dependent upon a variety of geographical, institutional

and perceptual values, the demand for public services in rural areas does not initially increase rapidly with population growth. As Alan Atschuler (1977:207) has noted, rural residents do not demand the same high level of public service as urban dwellers; for example, they get along well without sidewalks and lighted streets. By choosing to reside in a country setting, individuals accept that urban public services are often not readily available.

However, as residential density passes some threshold, many expensive public projects are required to meet new public service demands. Water and sewer system installation, while not necessarily the determinant of growth and secondary impacts, may be a key element because it tends to come first and accelerate the need for other services. Wilson (1968:85) has observed, "Water and sewer facilities stimulate and encourage development, and they are the framework on which the urban type community is built." Water lines, therefore, may be regarded as key indicators of the location of further population growth and future requriements for capital outlays.

In a social sense, the rapid growth of the rural nonfarm population relative to the established farm population can lead to problems resulting from conflicts in lifestyles. The local government must deal with any tension aroused against new residents who may not have a sense of local character and cultural values.

The Rural Land Use Planning Committee in North Carolina is aware of the impact of changing rural real estate values which are creating pressure for the conversion of agricultural land to residential uses in some areas at a rapid rate. This indirectly raises the cost of farm and forestry operations and influences farmers to leave their profession. According to the Committee (1978:4), "Farmers that desire to maintain their farms and forests have little protection from these land use intrusions."

"MANY FARMERS PROBABLY DISPUTE THE NOTION THAT THEIR LANDS ARE PART OF THE RURAL LAND USE PROBLEM..."

An inherent problem for planners concerned with rural land use impacts is the hesitancy of farmers in North Carolina to seek or trust any form of governmental intervention that affects the value of their property. Again, according to the Rural Land Use Planning Committee, "Many farmers probably dispute the notion that their lands are part of the rural land use problem and are skeptical about governmental interference." The pervasiveness of this sentiment is also reported by the *New York Times*,

> The long term solution (to the problems of rural growth) is land use planning. But those are fighting words in rural North Dakota, as they are in the other areas of the nation. Many farmers see land use planning as an encroachment on their property rights. They say they want no one telling them what they can or cannot do with their property (Reed, 1975).

RURAL WATER PLANNING IN NORTH CAROLINA

North Carolina has committed itself to a goal of balanced growth. The state government plans to work toward a higher statewide standard of living by maintaining a balance of population and jobs between small towns and larger cities. One stated policy is to "... provide adequate public services equitably and at least possible cost" (North Carolina Department of Administration, 1978:7). The state feels that good public services are necessary for more and better jobs and should be provided in order that growth may take place. A multiple objective approach is apparent in a second policy statement which advocates maintaining the state's environmental heritage while accommodating growth. There is an inherent conflict at the base of the two policy objectives which must be resolved at a local or regional planning level.

Two statewide comprehensive studies of water resource planning and capital improvements projects for North Carolina have been conducted. The *North Carolina Water Resources Framework Study* (North Carolina Department of Natural and Economic Resources, 1977) takes a broad overview of the total water resource needs of the state. As the first state comprehensive water resources policy statement, it functions as an official guideline for preparing water resource plans. The study assesses the current water resource situation and charts a general outline of future problem areas, but does not deal with specific impacts on local levels.

From 1973 through 1975, the North Carolina Department of Administration, with the assistance of the FmHA, prepared a series of water resource management plans for ten regions. The plans detail the present water situation, future needs, and recommended investments for each town and water association in the state. Although the problems of small town water provision are well defined, two shortcomings in the document are evident.

"ENVIRONMENTAL AND SOCIAL IMPACT MEASUREMENT IS IN ITS FLEDGLING STATE."

First, the needs and goals of residents beyond existing water systems are not addressed --in a sense these areas are "colored green" and forgotten. Also, there is no discussion of what the recommended system extension might mean in terms of growth and what that growth might bring in terms of induced impacts. The official stand of the FmHA is that its role is to help provide services to areas lacking dependable water in a manner that is consistent with local objectives. Land policy ought to be up to other agencies. This approach carries with it the obvious dilemma of an eventual mismatch of responsibilities. The FmHA and the state fund water system organizations as a wide variety of administrative levels, so that the agency responsible for installing and maintaining the water system is not necessarily the one which will have to cope with the eventual impacts induced by that investment. More communication and coordination among the agencies will be necessary to prevent future trouble.

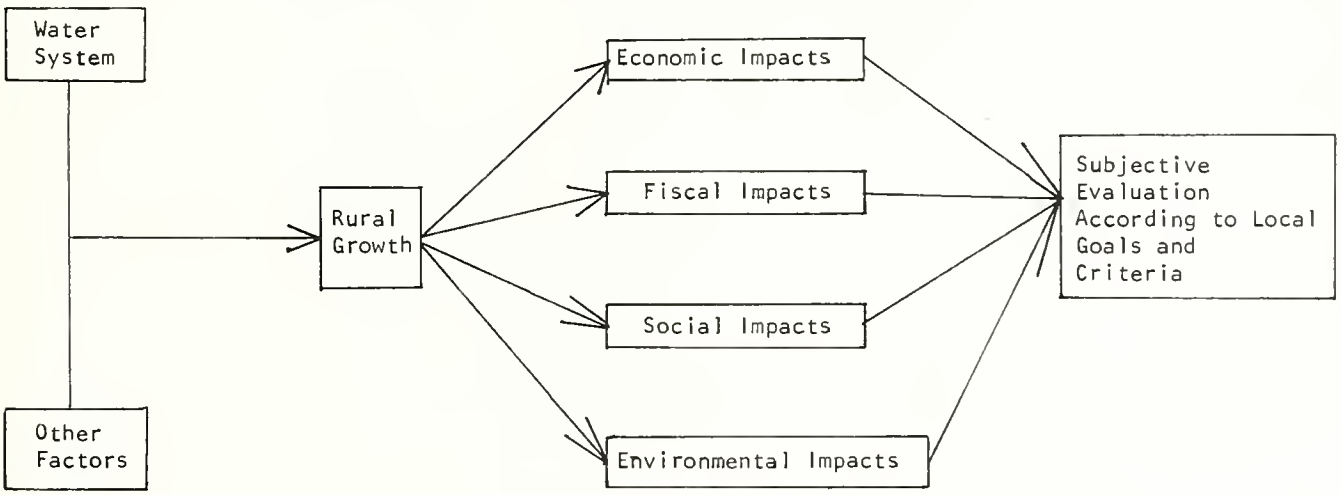
FUTURE NEEDS FOR WATER PLANNING IN NORTH CAROLINA

Two areas of planning need attention in rural North Carolina to avoid unnecessary problems in the future. First, local needs, goals, and objectives should be carefully considered and analyzed. Second, the evaluative criteria and process involved in planning and funding major public investments, including rural water systems, should be strengthened.

At present there is no set of plans dealing specifically with rural growth issues in North Carolina. The councils of government have adopted a land classification system which defines areas as developed, transition, community, conservation, or rural. The rural category, however, tends to be poorly defined and is treated as a catch-all after the other areas are delineated. The ambiguous definition results in "shades" of rural classification. The issue is further clouded by the official council of government interpretation of rural areas as being land that will not be serviced by sewer and water. This appears to conflict with official federal and state policies that encourage rural growth and development. A clear expression of community growth objectives on a local level, with goals stated as explicitly as possible, helps to guarantee that issues are brought into the open. This clears the path for consideration of a variety of future scenarios and gives citizens an opportunity to express their preferences for development. It also allows public officials to give consideration to the capacity of all public facilities and to plan for coordination to their distribution as growth brings increases in demand.

"THE RURAL CATEGORY TENDS TO BE POORLY DEFINED AND IS TREATED AS A CATCH-ALL AFTER OTHER AREAS ARE DELINEATED."

What seems most lacking in rural planning is a formalized evaluative procedure. Although it is true that federal and state funds cannot be used to finance projects which conflict with regional land use plans, the lack of specific criteria for judging



IMPACT ANALYSIS MODEL

FIGURE 1

the impact and attractiveness of water resource investments makes the judgement process an ambiguous one. Development proposals are too often judged on an ad hoc basis, which does not ensure consistency and fairness from one proposal to the next.

The problem is by no means a small one, for it is rooted in the difficulty of weighing and comparing impacts which are measured on noncomparable scales and are in many cases subject to perceptual distortion. Although economic costs and benefits can be computed and compared, environmental and social impact measurement methodology is in its fledgling stages and requires more study.

The relative permanence and potential impact of water system investment makes further research on appropriate rural plan design and criteria specification of extreme importance. To properly guide rural growth while maintaining rural character and identity, haphazard rural development must give way to a planned approach.

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